New Sprouts

Diversifying Agriculture on Kiribati's Outer Islands

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Cover photo: World Bank

Acknowledgments

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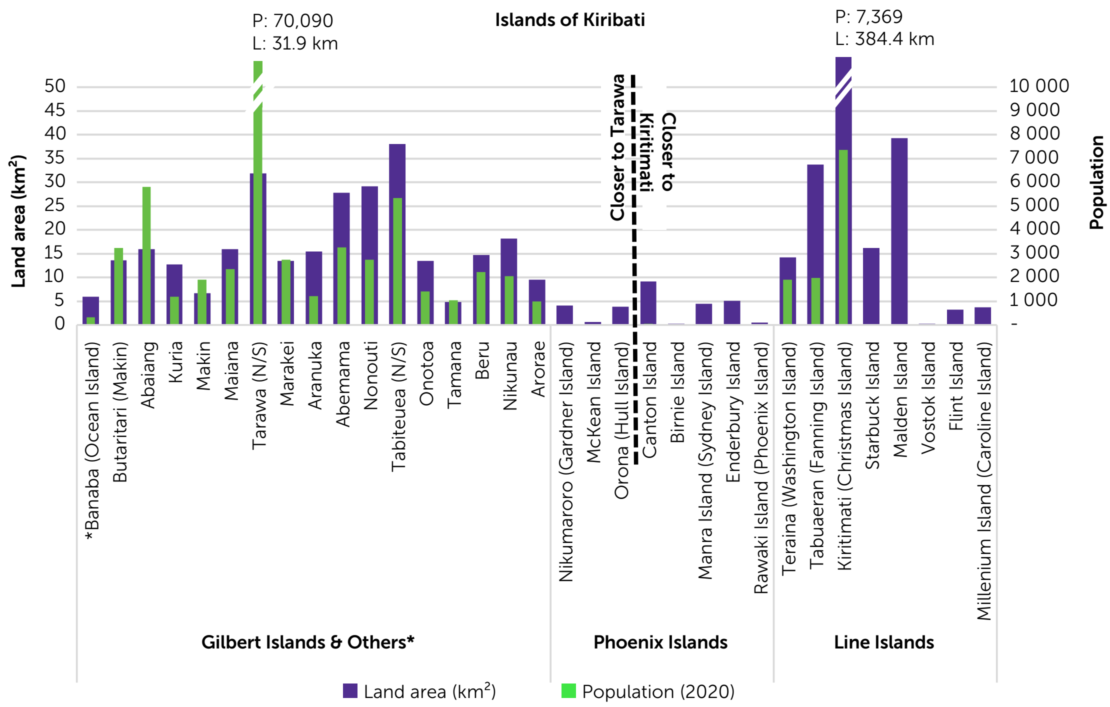
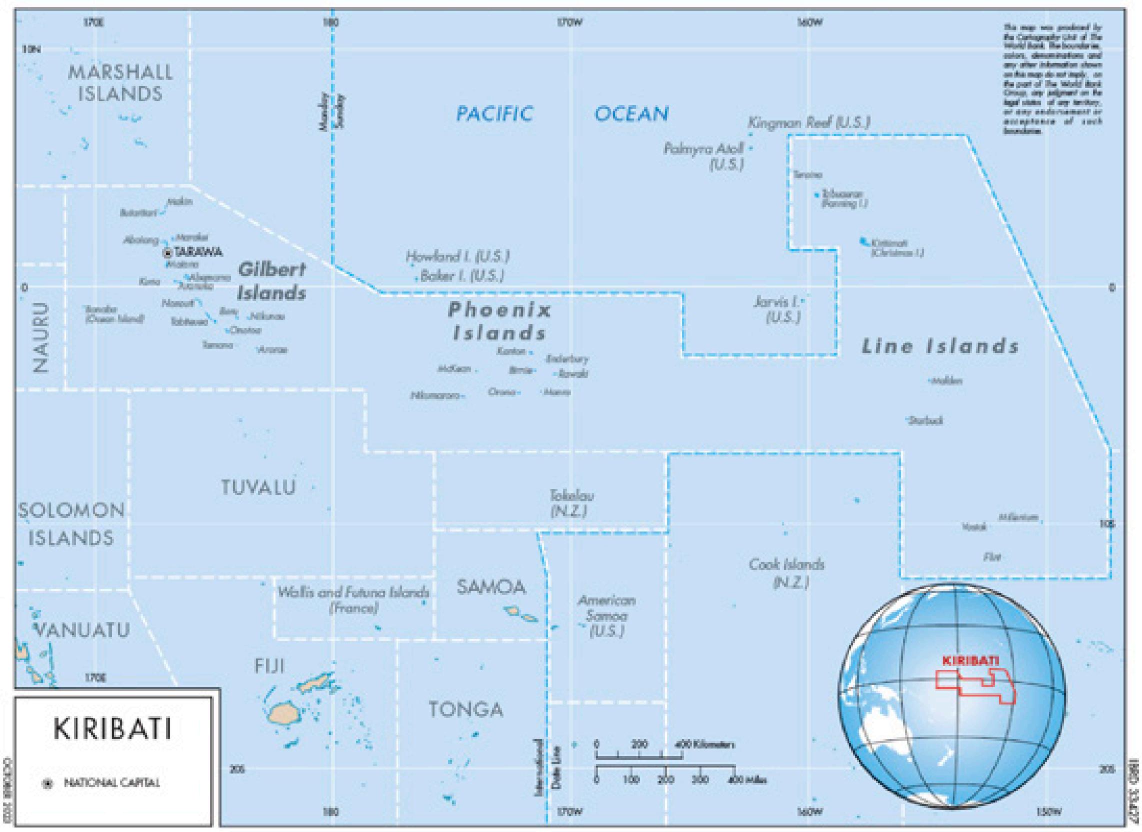
Abbreviations

ACIAR	Australian Center for International Agricultural Research
ADB	Asian Development Bank
ALD	Agriculture and Livestock Department
CNO	Crude Coconut Oil
CTA	Technical Centre for Agriculture and Rural Cooperation
DBK	Development Bank of Kiribati
DFAT	Department of Foreign Affairs and Trade
FAO	Food and Agriculture Organization
GEF	Global Environment Fund
GoK	Government of Kiribati
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFAD	International Fund for Agriculture Development
IFC	International Finance Corporation
IMF	International Monetary Fund
KCCI	Kiribati Chamber of Commerce and Industry
KCDL	Kiribati Coconut Development Limited
KNSO	Kiribati National Statistics Office
KSSL	Kiribati Shipping Services Ltd
MELAD	Ministry of Environment, Land and Agriculture Development
NCD	Non-Communicable Disease
PASA	Programmatic Advisory Service and Analytics
PNG	Papua New Guinea
SPC	South Pacific Commission
UNCDF	United Nations Capital Development Fund
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme

Kiribati: Geographic Factsheet





Background of the Engagement

What is the context of this report?

This report is part of a Programmatic Advisory Service and Analytics (PASA) that aims to analyze options for building economic opportunities in Kiribati's Outer Islands. Over the past 50 years Kiribati has seen a steady migration from the Outer Islands to the capital, South Tarawa. This has led to overcrowding in the capital and a decline in traditional diets, replaced by cheap imported foods. To counter this trend, the government has subsidized copra, the primary agricultural product of Kiribati, since the mid-1990s. The subsidy has been popular and provides cash employment. However, the subsidy has increased significantly in recent years. It is now a heavy burden on the Government's budget and has led to economic losses, over-concentration in copra farming, and poor access to fresh produce. The objectives of this PASA are therefore to analyze the impact of the copra subsidy on Kiribati's health, social protection, agricultural production and fiscal position, and to recommend policy actions to improve each of these areas, and build economic opportunities on Kiribati's outer islands.

The PASA is structured around three complementary studies. The first study (Cracking the Nut: A Proposal for Reforming and Upgrading Kiribati's Coconut Industry) focuses on the distortions generated by the subsidy on the copra sector, and investigates how to improve its efficiency and profitability. The second study (Cultivating Shared Prosperity: Reforming the Copra Subsidy to Improve Social Protection on Kiribati's Outer Islands) centers on the copra subsidy as a form of social protection, and explores alternative schemes to reduce poverty. This report (New Sprouts: Diversifying Agriculture on Kiribati's Outer Islands) is the third of the trilogy and explores options for diversifying the copra monoculture towards food production meeting local market demand.

What are the main conclusions of the companion reports?

The study on reforming the copra industry found that continuous government support is costly and sustains inefficiencies, recommending a gradual reduction of the subsidy with accompanying measures. The coconut industry is focused on copra (dried coconut) made by households and crude coconut oil (CNO) produced by a government-owned company for export. Continuous and increasing government support drains the state budget, sustains an inefficient industry, and incurs significant opportunity costs. Instead, the government could consider gradually reducing the copra subsidy while phasing in alternative and more efficient social protection programs, increasing economic efficiency and possibly attract new entrants targeting a broader range of market segments. This would require complementary measures to address keystone market and governance failures and facilitate new investment.

The study on reforming the copra subsidy to improve social protection found that both the poverty rate and public expenditure could be reduced by combining a reduced copra subsidy with targeted cash transfers. The copra subsidy serves as a social safety net by redistributing fishing rents to the Outer Islands. Although it targets the poor, it lacks efficiency because it reaches some wealthier households, while excluding some poor households altogether. The gradual reduction of the copra subsidy combined with targeted cash transfers would bring down the poverty rate at a lesser cost. This could be achieved by capping the subsidy at the poverty line and introducing cash transfers for poor households.

What does this report aim to do?

The report assesses Kiribati's agricultural sector and explores how enhanced food systems could provide alternative economic opportunities beyond copra production in the Outer Islands. The study reviews the broad challenges affecting the agriculture sector in Kiribati. In particular, it studies how limited food production, inorganized supply chains, and distortions from the copra subsidy contribute to food insecurity, malnutrition and widespread non-communicable diseases. It proposes a strategic framework for improving local food supply chains so they can generate income for Outer Islands farming households and enhance food security and nutrition. The study builds on the research conducted by the companion studies and advocates the reduction of the copra subsidy and the reallocation of part of the savings to the agriculture sector. It further delineates a set of incentives and policy measures designed to expand economic opportunities in the Outer Islands through enhanced food production and marketing.

The study is a rapid, primarily qualitative review intended to support policy dialogue on potential reforms for transforming food systems. Prepared within a short timeframe, it is based largely on desk research, supplemented by a few interviews with key stakeholders. Due to the limited availability of statistics on the agriculture sector, the analysis focuses mainly on available micro-economic data. Further in-depth contributions, such as feasibility analyses covering technical, financial, political, and administrative aspects of proposed reforms, or macroeconomic impact assessment modelling, could be conducted as the next step.

Who is this report aimed at informing?

The report is intended for use by both external and internal stakeholders. The direct clients for this work are the Ministry of Environment, Land and Agriculture (MELAD) and other ministries and agencies noted in the report that could contribute to developing reforms aimed at improving food systems. A secondary audience is the management of the World Bank Group organizations, including IBRD/IDA and IFC, as the report also aims at informing the design of technical assistance and investment programs they could offer. Finally, this study may help align other multi-lateral or donor agencies that wish to contribute to economic and social development efforts in Kiribati.

Executive Summary

1. **Despite urban migration and declining engagement, most households on Kiribati's Outer Islands remain involved in agriculture.** The lack of employment opportunities, vulnerability to climate change and remoteness result in continued urban migration. However, most of the country's 20,350 households still maintain some activity in the primary sector. While the majority of rural farming households cultivate coconut trees, the number of rural households engaged in crop production is declining, with the notable exception of vegetable production. In the Outer Islands, farming households focus on subsistence production for family consumption, and only a quarter of them grow some crops for the market.

2. **Changing dietary preferences, imported foods and insufficient and costly fresh produce, contribute to food insecurity, malnutrition and widespread Non-Communicable Diseases.** Traditional diets have shifted towards imported staple foods like rice, wheat, and sugar, along with processed foods, which are cheaper and easier to prepare and store in family kitchens. Consumers' preference for more affordable, non-traditional foods, along with limited local production, has resulted in diets high in sugar and fat, and low in nutritional value. Moreover, with limited and declining food production Kiribati is increasingly dependent on imported foods, which are mostly sold on the capital's markets. In addition to increasing global food prices, this has contributed to food insecurity for more than one third of Kiribati's population. The shift towards less diverse and nutritious diets also results in undernourished children, overweight adults and widespread Non-Communicable Diseases.

3. **A generous copra subsidy provides a major incentive to concentrate on copra production.** The price subsidy aims to sustain copra production for export, ensure a supply of cash in the Outer Islands and reduce migration. However, it has also led families to prioritize copra production to the detriment of food crops and livestock. The copra subsidy may have also contributed to limited government investment in the non-copra agriculture sector, hindering efforts to improve the production and commercialization of food crops.

4. **Alternative crop production is also hindered by challenging agro-ecological conditions and insufficient access to factors of production.** Soil fertility is low and freshwater resources are limited. Furthermore, with its atolls lying only a few meters above the ocean, Kiribati is particularly vulnerable to rising sea levels, storm surges and extreme tides associated with climate change. In turn, the rising sea level aggravates the scarcity of usable land for both human habitation and farming. The expansion of food cropping is also constrained by limited land availability and complex land tenure systems. 99 percent of the land is either owned by government or under customary tenure, there are lengthy registration processes, and frequent disputes over customary leases. Access to planting material is limited and the import of agricultural inputs is hindered by limited regional transport and inadequate capacities to ensure biosecurity. Finally, farmers' access to agriculture technologies and information is hampered by the limited outreach of public extension.

5. **There is a high demand for local fresh produce in South Tarawa, but it is not being met by suppliers.** Observations point to a significant demand for local fresh produce in South Tarawa. A comprehensive market assessment is needed to develop a strategy for food production and commercialization. Top of Form Most fresh produce is sold at roadside stalls and local markets. While formal markets offer good marketing opportunities, entry barriers to farmers are high. While farmers complain about low prices, end market prices in South Tarawa are very high. Ultimately, it is the fragility and lack of organization of the whole fresh produce supply chain that translate into the high prices seen in South Tarawa. The School Lunch Program offers interesting prospects for developing new, intra-island marketing channels for Outer Islands produce.

6. **The development of food supply chains is hampered by limited farmer linkages, absent storage, expensive shipping, and lack of financing.** Despite a robust demand in South Tarawa for fresh produce sourced from the Outer Islands, farmers lack critical information on market opportunities. Middlemen serve as the primary conduit for connecting rural producers to urban markets. They are often held responsible for pressuring farmers into accepting low prices at the farmgate, which discourages farmers from selling food crops. Lack of storage and poor handling generate high post-harvest losses at every stage of the supply chain. This contributes to poor quality and high prices on the South Tarawa markets, where local fresh products remain unaffordable for many residents. Shipping services are irregular, with small volumes and long distances translating into high transport costs. These are only partially offset by a government freight subsidy, which is difficult to access. Less than 15 percent of the population is financially included. In the primary sector, access to commercial loans is hampered by limited access to banking services, insufficient collateral, and lack of financial literacy.

7. **While challenges are well known and strategic directions are clear, results have been disappointing. De**spite widespread consensus on the most critical challenges and general strategies for fostering agricultural production, progress in diversifying the agriculture sector has been limited. Rapid population growth continues to raise demand for food, exacerbating existing challenges in local food production and further amplifying reliance on food imports. Incentives for farmers and traders have been insufficient to shift from subsistence to market-driven agriculture. Meanwhile, the copra subsidy has acted as a disincentive, discouraging farming households from diversifying towards cultivating food crops for domestic consumption.

8. **To achieve diversification, the first priorities would be to reduce the copra subsidy and transform food production and marketing.** Reducing the copra subsidy would create an environment that encourages food crops that are in demand on domestic markets. Given the central role of copra as a primary source of cash income, a lower subsidy must be coupled with measures that prevent additional hardship for farming families. In addition to introducing cash transfers for the poor, this would include measures aimed at boosting crop production for the domestic market. This includes strengthening agriculture support services, enhancing the efficiency of food supply chains and consolidating market demand. These efforts could be funded by the fiscal savings from lowering the copra subsidy.

9. **Transitioning towards market-oriented production requires scaling up adapted technologies.** Proven, low-cost technical solutions for cultivating food crops in Kiribati's harsh agroecological environment have been successfully developed, including in recent work by ACIAR (2020). These should be widely disseminated alongside nutrition education. Scaling up will also require expanding the access to climate-adapted seedlings by encouraging private sector nurseries, and increasing enclosed pigs and poultry production to supply animal manure for composting. Farmers' access to imported inputs should also be improved. Additionally, public extensionists should receive additional training so that they can promote new technologies, advise farmers on accessing markets, and improve the reach and relevance of their activities. Commercial entities, farmers' organizations, NGOs and development projects will be important partners in this training. A Do No Harm approach will be required to ensure that women's participation does not exacerbate gender disparities or gender-based violence, increasing workload or creating other challenges.

10. **Addressing the constraint of limited land availability for food cropping will be critical to scaling up production.** This will require streamlining leasing procedures for both public and customary land, and protecting parties in leasing agreements on customary land. Maximizing the productivity of current farmland through inter-cropping with coconut trees would also allow farm expansion.

11. **A Food Supply Chain Assessment would be beneficial.** The assessment would guide the Agriculture and Livestock Department (ALD) in providing support to develop market linkages. It should focus on analyzing market demand for Outer Island crops, profiling middlemen and farmers' organizations, examining how prices are formed in the supply chain, and assessing the potential for food processing development. Assessment outcomes should be widely disseminated, including through a Food Consultation gathering food actors and relevant ministries to agree on priority areas of support.

12. **Vertical and horizontal linkages between value chain players could be strengthened.** Middlemen would benefit from training to improve how supply chains are managed, which would lift product quality and safety. Empowering middlemen to provide farmers technical assistance and fair pay would make food supply more reliable. Alternative or complementary channels to middlemen could also be developed, such as farmers' organizations, and collaborative arrangements linking producers and buyers such as contract farming or productive partnerships.

13. **To further enhance the efficiency of food supply chains, post-harvest management, transport and access to finance will need to be improved.** Reducing post-harvest losses is crucial to increasing supply and lowering prices. Farmers, middlemen and shippers would benefit from training on how to handle produce. This could be complemented by public investment in ports, suitable storage, and a regulatory framework for food safety. Introducing a competitive, performance-based franchise shipping model would improve transport services offered by the primary shipping companies. Additionally, reforming the freight subsidy would support other, smaller shipping operators. Access to finance is essential for food supply chain players to invest in production intensification and business development. It could be improved through tailored financial products, including matching grants for investing in productive assets, as well as financial and business education.

14. **Demand for fresh produce from the Outer Islands would be improved by diversifying markets and improving awareness of healthy diets.** Public institutions offering meals to users, such as schools, hospitals and prisons, can offer reliable domestic markets for fresh produce to both producers and traders. Food processing would open new marketing channels for farmers, reduce waste and bring nutritional benefits. The consumption of local nutritious products should be further promoted by expanding broad nutrition education programs, with a focus on schools.

15. **Data and analysis focusing on the agriculture sector need improvement.** Significant data gaps exist in critical areas such as production and yields, farm structures and land use, prices and markets. Regular data collection, analysis and dissemination is crucial to guide policy development, monitor policy performance, and support policy dialogue.

16. **This report identifies four top priorities for diversifying Kiribati's agriculture, which could form the basis of an agriculture roadmap.** The roadmap would need to account for the particular geography, climate and market proximity of each island. It would involve a financing strategy to leverage savings from reduced copra subsidies, development partners' funding, and private investment. The priorities are:

    i. **Lower the copra subsidy** to provide an incentive for farmers to commercialize other crops

    ii. **Conduct a food supply chain assessment** to collect detailed data on market demand and supply

    iii. **Provide additional training to ALD staff** to support, rather than substitute, private sector activities; and

    iv. **Build the capacity of middlemen** to reduce post-harvest loss, and improve information exchange and supply chain reliability

The full list of policy recommendations is included in Appendix 1.

1. The context

Agriculture plays a vital role in the economy but the focus on copra leads to weak growth, poor nutrition and gender inequality

1.1 Despite urban migration and declining engagement, many households remain involved in copra farming which weighs on growth

1. **Kiribati is one of the smallest and most remote countries in the world, and one of those most exposed to climate change.** Kiribati, a young nation with a population of 119,000 (KNSO, 2021a), spans over 3.5 million square kilometers of ocean and consists of 33 low-lying coral island atolls with a narrow land area of 800 square kilometers. Located more than 4,000 kilometers from the nearest major economies in Australia and New Zealand, the country is divided into three major island groups. The Gilbert Islands in the west include the fertile Northern Gilbert Islands with higher rainfall supporting diverse crop cultivation, while the Central and Southern Gilbert Islands are drier. These islands are the most populous and economically active in Kiribati, situated closer to the main market hub of Tarawa in the Central Gilberts. Approximately 1,480 km eastward lie the Phoenix Islands, mostly uninhabited except for one sparsely populated island. Further east are the Line Islands, characterized by dry ecosystems. They include Kiritimati, the world's largest atoll that covers almost half of Kiribati's land area (388 square km) but hosts only about 6 percent of its population.

2. **Kiribati struggles to retain its population in rural areas.** The country is young, with 54 percent of residents under the age of 25 (KNSO, 2021a). Rural residents are distributed across the 22 inhabited Outer Islands, with populations varying from 7,000 to 40 people. Under the combined effect of demographic growth and internal migration, urbanization is rapidly increasing, and most of the population is now concentrated in the two main urban centers of South Tarawa, the densely populated capital (53 percent of population), and Kiritimati (6 percent) (KNSO, 2021a). Continued rural migration to the capital exacerbates social and environmental challenges in South Tarawa and reduces labor resources for the agriculture sector in the Outer Islands. The rural to urban drift is driven by the lack of employment opportunities, vulnerability to climate change, remoteness, declining youth interest for traditional agriculture and perceived improved livelihoods opportunities in South Tarawa.

3. **Agriculture remains a critical sector for the economy of Kiribati's Outer Islands.** Agriculture, forestry and fishing contribute 23 percent to Kiribati's Gross Domestic Product (ADB, 2022) and account for 23 percent of total employment, or 7,029 persons who have their main activity in the primary sector (KNSO, 2021a). More broadly, 76 percent of the country's 20,354 households have some activity in the farming and fishing sector, including livestock raising, fishing activity and crop growing (KNSO, 2021a), often undertaking a combination of these activities. In the majority of the Outer Islands[1], more than half of the households grow crops (Figure 1) and more than 70 percent raise livestock, mostly pigs and poultry (Figure 2).

1 All islands, except South Tarawa.

FIGURE 1. *Percentage of total number of households growing crops in inhabited Outer Islands*

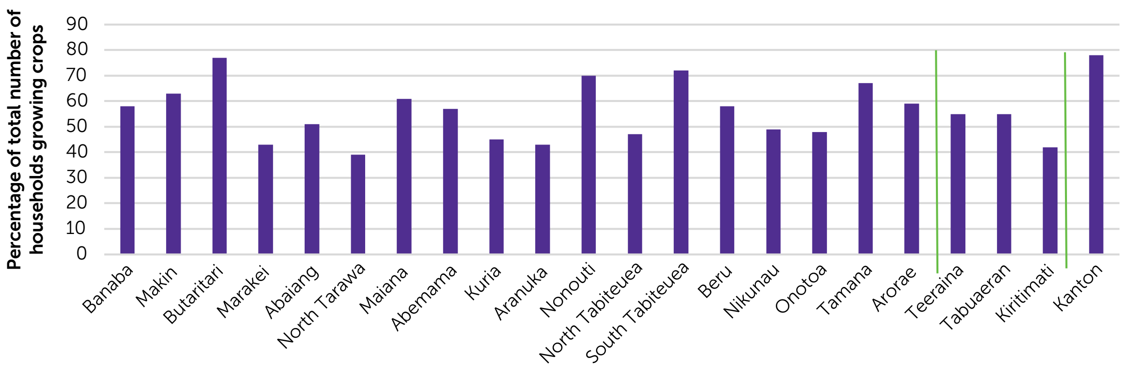
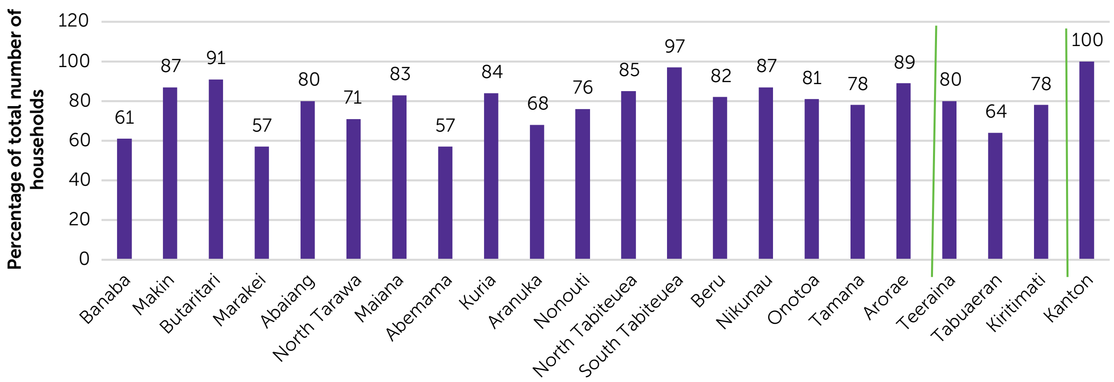


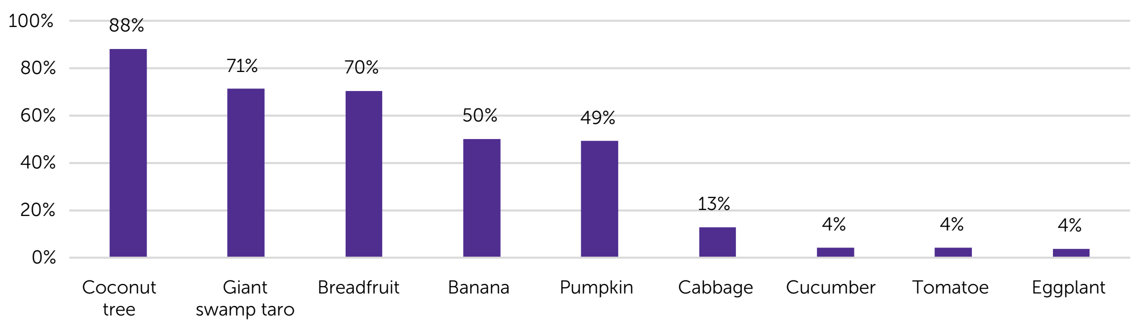
FIGURE 2. *Percentage of total number of households raising livestock in inhabited Outer Islands*



Source: GoK, 2022.

4. **Kiribati's agricultural production is centered on coconut trees.** Coconut, revered as the "tree of life" in Kiribati, is a vital resource for food, medicine, and construction, while also being an important source of income and a primary export product for the country. Coconut trees are cultivated by 48 percent of households nationwide and the vast majority (88 percent) of rural farming households (Figure 3). The second most important crops, giant swamp taro and breadfruit, are cultivated by around 70 percent of the rural farming households, and about half of them cultivate banana and pumpkin. On the lower end of the scale, cabbage is grown by 13 percent of rural farming households, while exotic varieties of vegetables or fruits like cucumbers, tomatoes, eggplants, and papaya are cultivated by a mere 4 percent (KNSO, 2021a). While atolls are widely planted with coconut trees, food crops are mostly grown for home consumption, in backyard gardens averaging 12 square meters (IFAD, 2022).

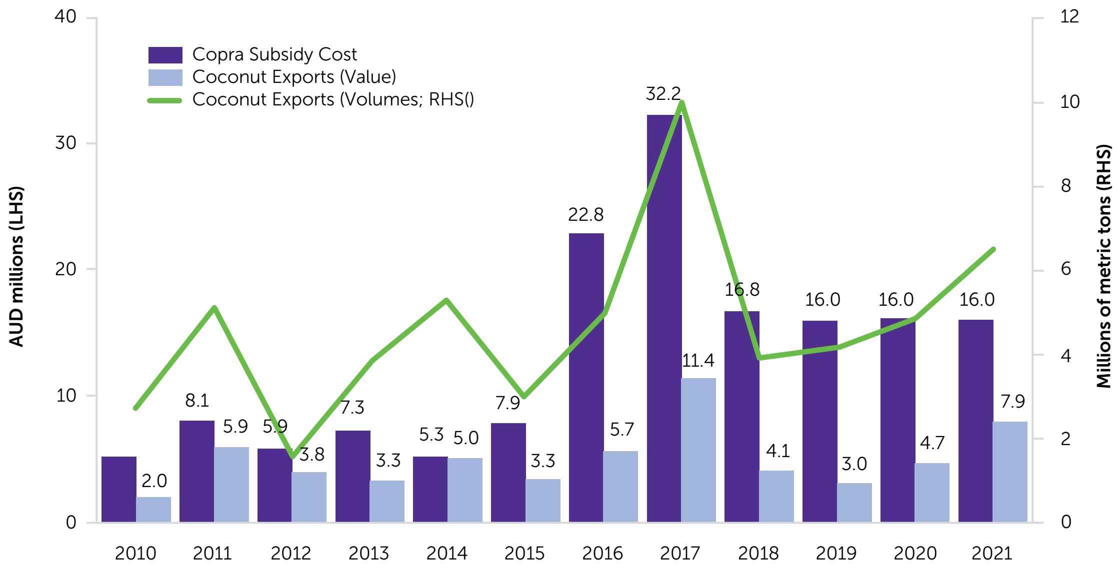
FIGURE 3. *Percentage of rural cropping households by main types of crops*



Source: KNSO, 2021a.

5. **The copra subsidy leads to a direct loss in economic value of at least 2% of GDP, and weighs on growth by distorting households' labor market decisions.** Figure 4 shows that the government buys copra for more than it earns in exports. The gap ranges from 2-10% of GDP per year, which amounts to a direct loss of economic value. In addition, the subsidy gives households an incentive to engage in an unproductive activity. If households weren't collecting the copra subsidy they could otherwise be engaging in fishing or seaweed cultivation – both current or former export industries. They could also be farming food for domestic consumption, or for the tourism sector. These are very likely to have higher returns than copra farming, but given limited data the effects are difficult to estimate.

FIGURE 4. *Copra Subsidy Cost and Coconut-Related Exports*

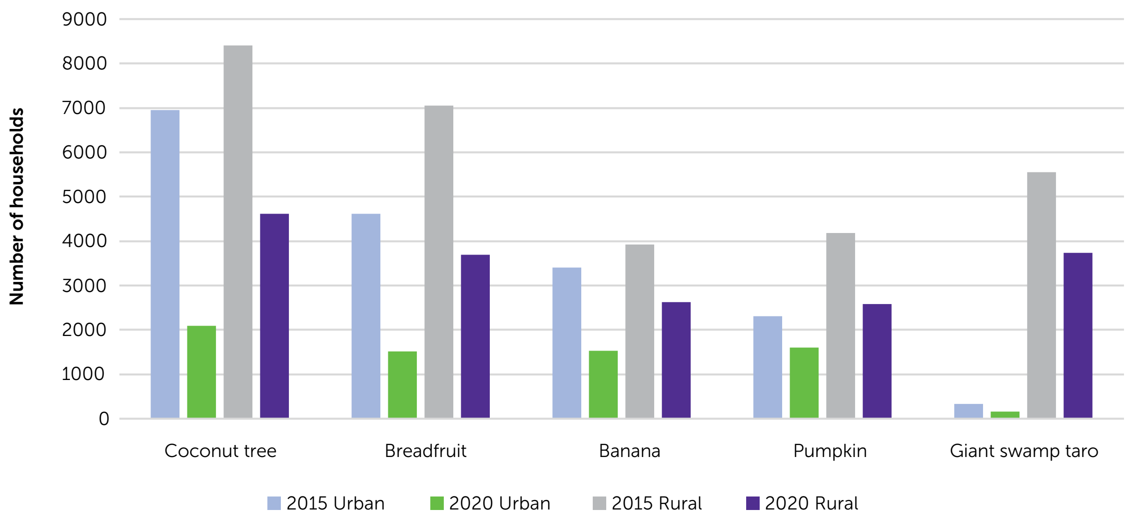


Source: IMF Article IV Staff Report (2024)

6. **The copra subsidy also exacerbates Kiribati's large trade deficit.** Households receive at least twice as much from the copra subsidy as copra earns in export revenue. The subsidy is typically spent on imported goods. In 2022 Kiribati's trade deficit was worth over 85% of GDP (IMF, 2024), 70% of which was due to a deficit in goods trade. Food accounted for one quarter of goods imports. Lowering the copra subsidy would reduce the imbalance and encourage farmers to grow food for domestic consumption. The heavy reliance on imported food exposes Kiribati to disruptions to global trade networks, as happened during the COVID pandemic in 2020. It also leads to diets that have lower nutritional value, as we will see below.

7. **The number of households engaged in crop production is declining, except for vegetable production.** Despite a generous copra price subsidy and a 14.5 percent rise in Kiribati's population between 2015 and 2020, the number of urban and rural households cultivating coconut trees or other main traditional crops has declined, with reductions ranging from 30 to 70 percent for each crop type (Figure 5). Increasingly challenging agricultural conditions, combined with changing food preferences and challenging access to the urban markets, may explain the decline for food crops. The decrease may also be attributed to the consolidation of farming operations into fewer households managing larger farms, but there is insufficient data on the extent of agricultural landholdings to verify this hypothesis. Conversely, there has been an increase in the number of households cultivating sweet potato, cassava, and melon, and, notably in South Tarawa, Betio and Kiritimati, cabbages, cucumbers and tomatoes. Favored by their proximity to urban markets, more farmers participate in vegetable production in the urban islands, with 38 percent of urban cropping households growing cabbages and around 15 percent engaging in the cultivation of other types of vegetables (KNSO, 2021a).

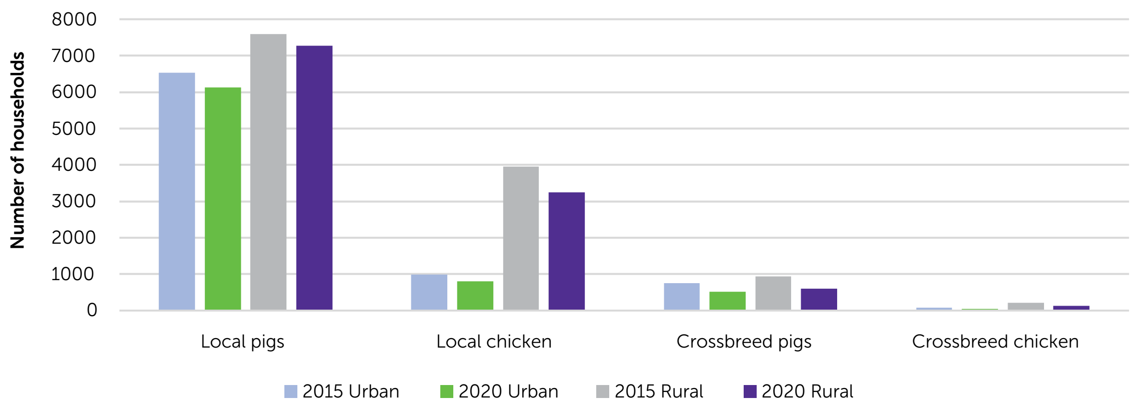
FIGURE 5. *Number and change in urban and rural households growing main crops by crop type and strata, 2015-2020*



Source: KNSO, 2021a.

8. **Livestock production is focused on free ranging local breed pigs.** While fish remains the primary source of protein, most households raise small livestock using subsistence free range systems. Local breed pigs are raised by 66 percent of all households, and almost the totality (97 percent) of the rural livestock households, with an average of 3 pigs per household. In contrast, local chickens are raised by only 43 percent of the rural livestock households, with an average of around 11 birds per household. The proportion of rural livestock households raising crossbreed pigs or chickens is significantly lower, at 8 percent and 1 percent respectively, with smaller holdings of 1.7 pigs and 6 birds. The preference for local breeds may stem from their inherent resistance, ability to thrive on foraging, and the fact that, for most households, livestock raising is not primarily pursued as an economic activity. Similarly to the situation with cropping households, there was a decrease of the number of rural and urban households raising livestock in 2020 compared with 2015. The decrease was much more pronounced for crossbreed pigs and chickens than for local pigs and poultry, and for urban households than for rural ones (Figure 6).

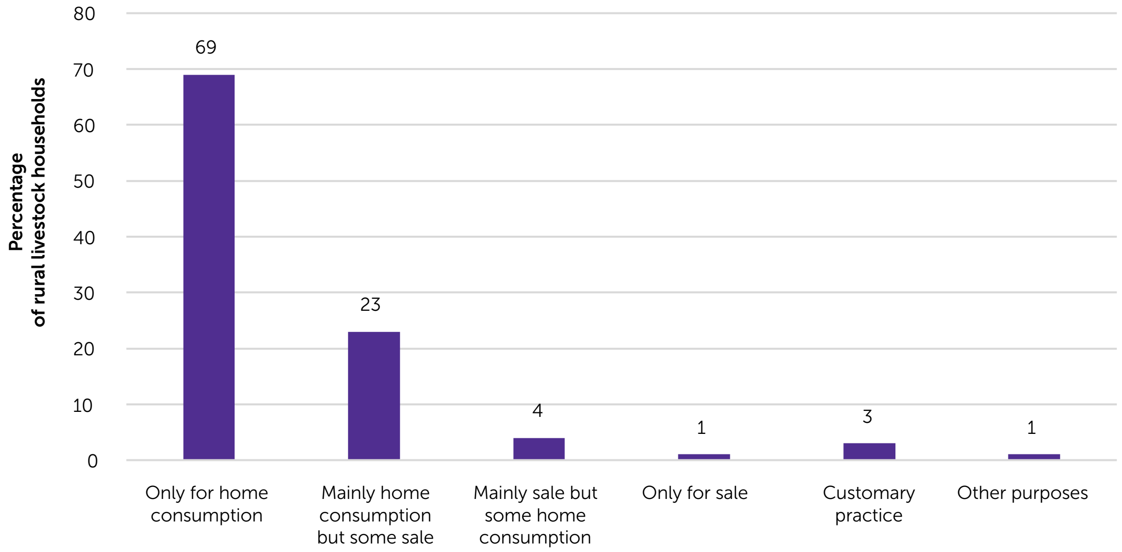
FIGURE 6. *Number and change in urban and rural households raising livestock by livestock type and strata, 2015-2020*



Source: KNSO, 2021a.

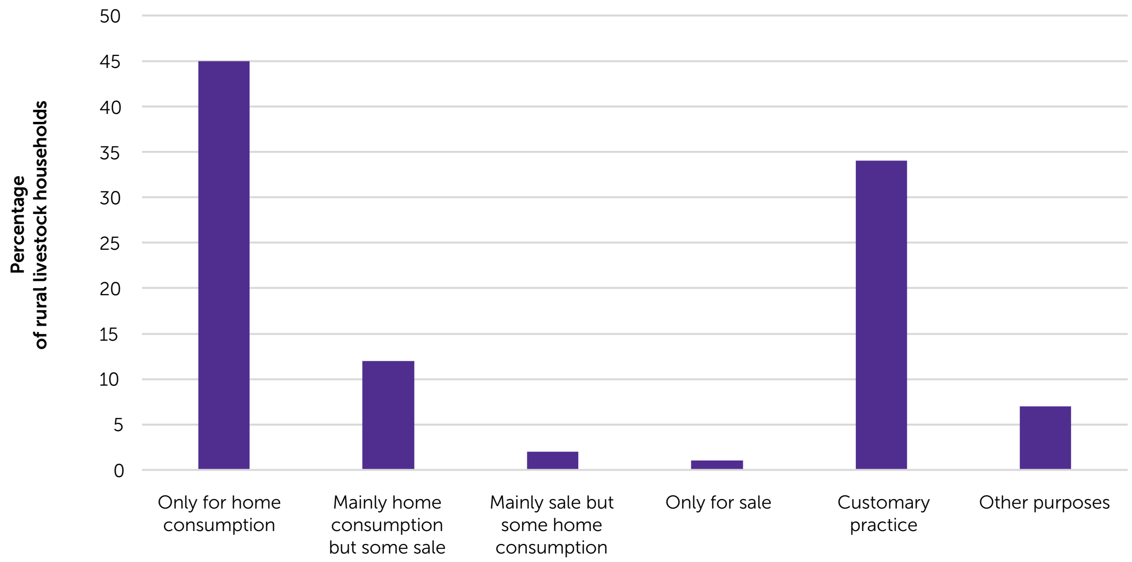
9. **Farming primarily serves family consumption, with only around one third of rural households selling surplus produce.** In the rural islands, 92 percent of rural farming households focus on subsistence production "only" or "mainly" for home consumption (Figure 7). Only 4 percent of rural farming households grow crops primarily for sale with some home consumption. One percent of rural farmers nationwide grow crops solely for sale, and they are all located on urban islands. With regard to crops, rural households sell 36 percent of their fruits harvested, including coconuts, breadfruit and papaya. 28 percent of harvested vegetables are sold, including pumpkin and cabbage, and 12 percent of root crops are sold (GoK, 2020). Similarly, 91 percent of rural households involved in livestock rearing raise animals for home consumption, either solely or mainly, and for customary ceremonies such as weddings, birthdays and funerals (Figure 8). Only 15 percent of rural households engage in livestock sales, either mainly or partly, with just 1 percent selling livestock as their main activity.

FIGURE 7. *Rural farming households growing crops by purpose*



Source: KNSO, 2021a

FIGURE 8. *Rural farming households raising livestock by purpose*



Source: KNSO, 2021a.

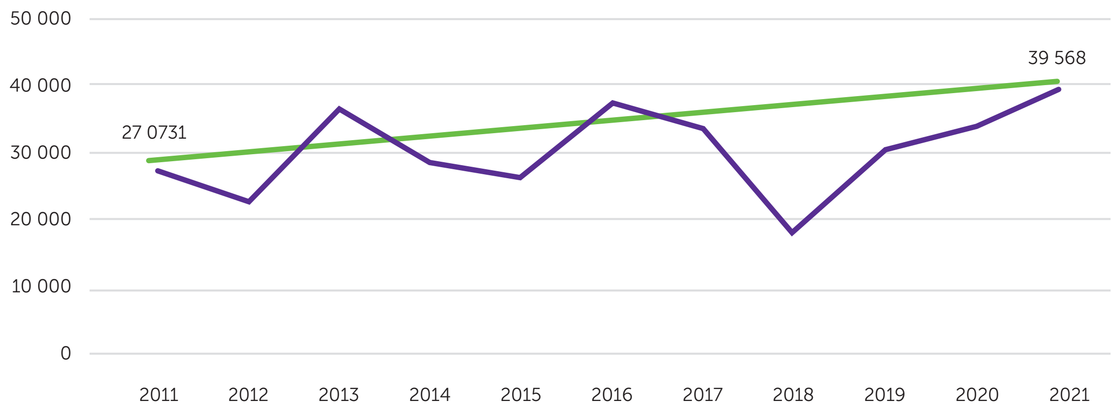
1.2 Dietary preferences, imported foods and an undersupply of fresh produce contribute to food insecurity, malnutrition and widespread Non-Communicable Diseases

10. **Traditional diets have shifted towards imported and processed foods.** Traditional diets in Kiribati were almost entirely sourced locally and composed of fish, shellfish, pandanus, breadfruit, taro, coconut, wild fig, pumpkin, banana, sweet potato, and pawpaw. Any surplus was dried and stored using traditional postharvest handling methods (CTA, 2019). Traditional knowledge for fishing, farming, and care for farmed and wild plants and animals has declined over time, and traditional forms of food preparation and preservation are largely unknown to young people (MELAD, 2020). Imported staple foods such as rice, wheat, sugar or oil, as well as processed food such as instant noodles, cakes, biscuits, sugar sweetened beverages and processed fish and meats are now widely available in food markets and shops across urban and rural areas. Aside from being cheaper, they are also easier to prepare, use and store in family kitchens, which has further contributed to a decline in the consumption of traditional and locally produced foods (Raneri, 2022).

11. **Diets are now high in sugar and fat, and low in nutritional value.** Seventy percent of average dietary energy in Kiribati comes from carbohydrates. Rice is the largest source of calories, and accounts for 30 percent of the dietary energy consumed, followed by sugar (14 percent) and bread (7 percent). Protective foods that are rich in vitamins A or C, such as fruits and vegetables, and body building foods that are rich in vitamin B12, calcium or proteins, such as fresh fish or chicken, represent less than 11 percent of the dietary energy consumed (Troubat and Sharp, 2021).

12. **Kiribati is increasingly dependent on imported foods due to low domestic production.** Limited and declining production and marketing of food crops and livestock, along with a growing population have increased Kiribati's dependence on imported food. In 2021, food imports were valued at US$35 million, a 46 percent increase over 10 years, and represented 366 percent of total exports (Figure 9). Rice and wheat flour are the two main imported food products, together representing around 42 percent of total food imports, followed by sugar (19.5 percent), meat (15 percent), dairy (8 percent) and vegetables and fruits (7.6 percent) (FAO, 2024). Of the fruits and vegetables that arrive to Kiribati, most are sold on South Tarawa markets, with little supply being sold in the Outer Islands (GoK, 2024).

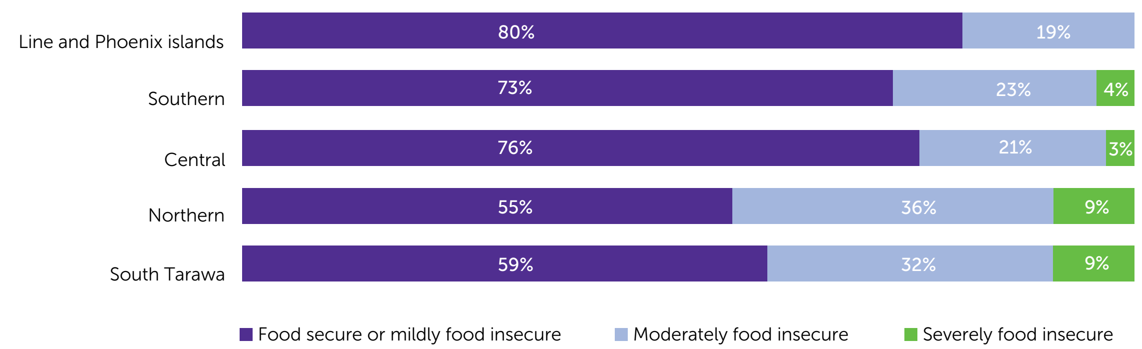
FIGURE 9. *Value of food imports 2012-2021 (US$000)*



Source: FAO, 2024.

13. **More than one third of Kiribati's population is food insecure.** Food represents the primary share of household spending, averaging 60 percent of total expenditure (Troubat and Sharp, 2021). On average, 70 percent of dietary energy consumption is purchased in cash, and only 12 percent comes from own produced foods. Low domestic production, significant reliance on imported staple foods and increasing global food prices contribute to an estimated 36 percent of people experiencing moderate or severe levels of food insecurity. Of these, 29 percent, or around 5,800 households, have difficulty in accessing safe and nutritious foods, and 7 percent, or 1,300 households, do not have enough access to food, to the point of experiencing hunger (Troubat and Sharp, 2021). The Northern region (which hosts the second largest share of population, or 20 percent) and South Tarawa have the highest proportion of food insecure households (Figure 10).

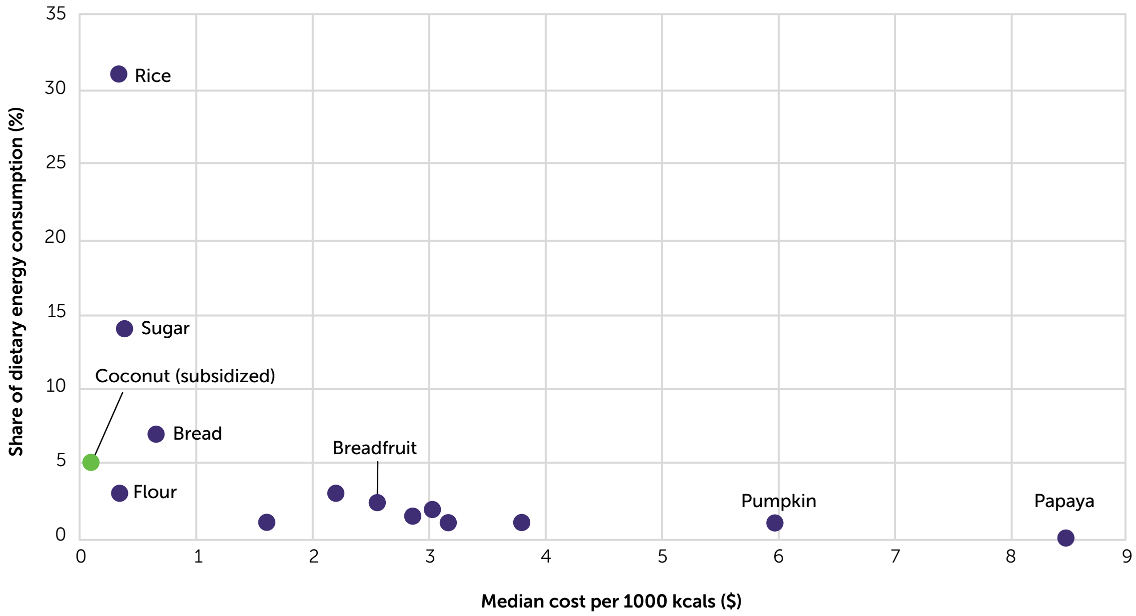
FIGURE 10. *Regional distribution of food secure and food insecure households*



Source: Troubat and Sharp, 2021.

14. **Diets are low in domestically produced fruit and vegetables because they are more expensive than imported staple foods.** Imported cereals, notably rice and flour, contribute 59 percent of the purchased dietary energy (FAO, 2021) and have become integral to the Kiribati diet due to their affordability compared to local staple crops like breadfruit, and swamp giant taro (Figure 11). Only 56 percent of households consume breadfruit, and less than 15 percent of households consume other locally grown fruits like pandanus or bananas, compared with 97 percent consuming rice (GoK, 2020a). This reliance on the cash economy heightens households' vulnerability to price fluctuations and amplifies their sensitivity to lower prices offered by imported food items compared to local staples.

FIGURE 11. *Cost of 1 000 kcal and share of the average dietary energy consumption*



Source: Troubat and Sharp, 2021.

15. **The shift towards less diverse and nutritious diets has contributed to undernourished children, overweight adults and widespread Non-Communicable Diseases (NCDs).** Although Kiribati has seen progress in reducing stunting, 15.2 percent of children under 5 are still affected (Development Initiatives, 2018; KNSO, 2019b). Additionally, approximately 80 percent of adults are overweight, with 54 percent of women and 45 percent of men living with obesity (GoK, 2024). In 2019, there was a 51 percent probability of premature mortality attributed to cardiovascular disease, cancer, diabetes, or chronic respiratory disease, reflecting the risk of premature death between the ages of 30 and 70 (SPC, 2019). Other prevalent nutrition-related disorders include vitamin A deficiency as well as anemia among children. The significant economic costs associated with NCDs continue to be a major burden on the health budget, impacting productivity and income at national, household, and enterprise levels, and hindering overall national development (GoK, 2024).

1.3 Women are predominantly responsible for domestic tasks, facing heavy workloads and pervasive gender-based violence

16. **Women shoulder a significant burden of multiple tasks centered around the home.** Coconut farming and the associated tasks of cutting, collecting, and de-husking nuts are primarily undertaken by men, while women bear the responsibility of childcare, household chores, water collection, home gardening, and crafts (GoK, n.d., a). Village remoteness and the lack of agriculture tools contribute to further increasing women's workload (IFAD, 2014). Moreover, women lack control over productive resources and have less access to opportunities and services than men (Klassen and Harrison, 2018). High rates of gender-based violence, with 67 percent of women experiencing physical or sexual violence by an intimate partner in their lifetime (KNSO, 2020a), greatly hinder women's participation in productive activities.

17. **Male outmigration results in women assuming the role of heads of households and constrains families' dietary options.** With the migration of working age males, women in the rural islands head one in five agricultural households (KNSO, 2020a). Male outmigration has led to increased dependency on imported food as women are unable to perform heavy tasks such as collecting coconut sap and other tree crops, de-husking coconuts, fishing, and tending traditional babai pits (IFAD, 2014).

18. **There is a risk that women's integration into agricultural diversification and commercialization efforts may exacerbate gender disparities.** Supporting women in transitioning from home gardening to producing and marketing food crops could improve family nutrition, generate income, and promote women's empowerment. However, it could adversely affect women livelihoods by increasing their workloads or exposing them to domestic violence due to their increased economic independence (International's Women Development Agency, 2018). A Do No Harm approach is required to ensure that women's economic empowerment initiatives do not inadvertently exacerbate existing gender disparities, induce gender-based violence or create new challenges for women (Swanepoel, 2023).

2. The challenge

Heavy distortions, difficult growing conditions, lack of inputs, and weak supply chains discourage farmers from supplying the market despite high demand

19. Despite high demand for fresh produce in South Tarawa and Kiritimati, farmers on the Outer Islands have little incentive to shift from subsistence to market-driven agriculture. The main reasons are the government's generous copra subsidy which makes copra production more attractive, difficult agro-ecological growing conditions, and weak supply chains.

2.1 Generous government subsidies encourage farmers to focus on copra production

20. **The copra subsidy scheme consists of two tiers: one involving a direct production subsidy to farmers, and another supporting the operation of state-owned enterprises.** The copra subsidy scheme was introduced in the mid-1990s. By redistributing revenues earned from fishing license fees to the population of the Outer Islands, the subsidy aims to achieve multiple objectives: sustaining copra production and boosting GDP and exports; ensuring a supply of cash in Outer Island economies, particularly for the unemployed; and reducing migration to South Tarawa (World Bank, 2018). Under the subsidy scheme, farmers deliver copra (or sun-dried coconut flesh) to Island Councils-managed warehouses, and receive a subsidized price set by the government. Initially set at AUD$ 1, the subsidy doubled in 2016, enabled by an increase in fishing license revenues (UNCTAD, 2020) and in line with electoral promises (Webb, 2020). The subsidy was doubled again in 2022. The Island Councils store copra until it is shipped to facilities of state-owned Kiribati Coconut Development Limited (KCDL) in South Tarawa. Shipping by state-owned Kiribati Shipping Services Ltd (KSSL) is also subsidized through a freight subsidy. KCDL receives the product without having to compensate the government. As reviewed in the companion study on reforming the coconut industry, the current price paid to coconut farmers is at least quadruple the international price (World Bank, 2024c).

21. **The copra price subsidy, along with a lack of commercial opportunities, encourages farmers to prioritize copra over other crops.** The government's substantial price subsidy provides a major incentive to allocate male labor, particularly young men, to coconut cutting, collecting, de-husking, and copra drying. Additionally, with guaranteed payment regardless of copra volume or quality, farmers risks are substantially reduced. While traditionally copra meal provided a cheap source of pig feed, farmers now have to buy copra meal pancakes from KCDL to feed their pigs as the entire copra production is absorbed by the subsidy scheme. This shift may contribute to decreased pig production, subsequently reducing the availability of manure — an essential compost ingredient and potential source of biogas, as successfully experienced in Tuvalu.

22. **The copra subsidy may also contribute to limited government investment in the agriculture sector.** In 2022, the copra subsidy accounted for 10.2 percent of national public expenditure in 2022 (IMF, 2023b). With a total amount of US$ 19.5 million, it is the first expenditure in the 2024 Development Budget, representing 9 percent of the total budget and 21 percent of the government-financed Local Contribution to the Development Fund[2]. Regarded as a social protection payment, the copra subsidy is disbursed by the Ministry of Finance and Economic Development. In contrast, the allocation of the Ministry of Environment, Land and Agriculture Development (MELAD) represents 4.7 percent of the total development budget, and is entirely financed by development partners. While the government has been advocating food production for the domestic market over the past decades, the substantial share of the national budget allocated to the copra subsidy limits its ability to invest in addressing challenges affecting the production and commercialization of food crops.

2.2 Other crop production is also hampered by challenging agro-ecological conditions and poor access to factors of production

a. The agro-ecological environment is harsh and highly vulnerable to climate change

23. **Soil fertility is low and freshwater resources are limited.** The soils of Kiribati atolls are predominantly derived from coral limestone. They are alkaline and coarse textured, have a limited water holding capacity and low organic matter content, and they lack most nutrients required for plant growth. This in turn constrains crop variety and severely limits agricultural potential (GEF-UNDP, 2008; Rimon, 2020). The atolls have low annual rainfall (from 1,500 to 2,000 mm), which is subject to increasing seasonal variability. Northern Islands receive the most rainfall, while the Southern Islands tend to be the driest region (MELAD, 2020). In 2022, the Government of Kiribati declared a State of Disaster due to lasting drought conditions caused by below normal rainfall. Because of the low rainfall and the soils' poor water holding capacity, groundwater resources are limited.

24. **The lack of fertile soils and water resources is exacerbated by climate change.** With its atolls lying only a few meters above the ocean, Kiribati is particularly vulnerable to rising sea levels, storm surges and extreme tides associated with climate change. Floods damage infrastructure and cause land loss and coastal erosion. Sea-level rise, along with drought and overuse of groundwater, also threatens freshwater aquifers with saltwater intrusion. Changing rainfall patterns, with more frequent and longer droughts, further affect water availability. Water scarcity is already experienced in some of the Outer Islands, where limited water availability can lead to competition between agriculture and household use (GoK, 2022). Additionally, the increasing incidence of pests and diseases poses a growing threat to agricultural production and food security. Infertile soils and water stress severely constrain food production, discouraging farmers from investing time and labor into unproductive food cropping and limiting them to a reduced number of food plants on small home plots.

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2 The Development Fund brings together the Government of Kiribati funded Local Contribution to the Development Fund (LCDF), and pledges from development partners. In 2024, the LCDF contribution is equivalent to US$91.9 million, or 44 per cent of the total development budget of US$206.8 million.

b. Limited land availability and complex land tenure systems constrain the expansion of food cropping and hamper agriculture investment

25. **The lack of freehold land exacerbates constraints on land resources.** The narrow land mass, compounded by the harsh environment and the priority given to cultivating coconut trees, leads farmers to limit food cropping to small backyard gardens for family sustenance. The rising sea level aggravates the scarcity of usable land for both human habitation and farming. In 2018, available agricultural land was estimated at 42 percent of the nation's total, compared to 53 percent in 1964 (MELAD, 2020). Land tenure systems further complicate the expansion of farming. Sixty percent of the land in Kiribati is owned by the government (including all land in the Line and Phoenix islands), while about 40 percent is held under customary tenure, and less than 1 percent is freehold land, which is reserved for citizens. Registration of property requires over 500 days as assessed by the latest Doing Business report (World Bank, 2020). Government land offers potential but is hampered by inadequate zoning and leasing arrangements.

26. **Opportunities for acquiring or leasing customary farmland are limited by restrictive tenure regulations, lengthy registration procedures and frequent disputes over customary leases.** Customary land is collectively owned by a community. It is predominant in the Northern and Southern islands and legally recognized. Land transactions require unanimous consent, and the sale or transfer of customary land is prohibited outside of the customary landowning group, except to the state or community organizations. Leasing is possible to people outside the customary group, but requires a lengthy approval process, from MELAD up to the Cabinet, and final endorsement by a Magistrate Court. In practice, very few leases of customary land are approved.

27. **The leasing of customary lands often leads to prolonged disputes as all owners must agree to the transfer of leasehold rights.** Land disputes are common and are mostly caused by issues over land registration, claims of ancestor ownership, and boundary disputes. Even when a judgment is given, the dispute may be reopened for a secondary judgment in cases such as: (a) if a party that is entitled to be summoned has not summoned to the original proceedings, (b) a party arguing that there was no entitlement for another party to have the land registered in their name, or (c) that the boundary outlined by the Magistrate was inconsistent with the original boundary (World Bank 2020). The possibility to reopen settled disputes makes customary land leases particularly challenging to establish. Land-related issues are analyzed in more detail in the companion study on reforming the coconut industry.

28. **The lack of secure land tenure prevents agriculture investment.** Difficulties in obtaining land tenure security pose a significant barrier to expanding agricultural production and investing in durable assets on farmland due to the considerable risk of potential loss.

c. Access to inputs and other production support services is low

29. **Access to planting material is limited, and government nurseries compete with private farmers.** Farmers of the Outer Islands lack good quality seedlings and seeds. MELAD's Agriculture and Livestock Department (ALD) operates nurseries on every Outer Island and sells seedlings at production cost. It plans to convert these nurseries into expanded farms capable of mass-producing not only plant materials but also vegetables. These would be sold to South Tarawa at lower prices than those currently charged for the limited volumes of farmers' produce available from the Outer Islands. Revenue generated from ALD's farms would be reinvested into improving extension services for farmers. However, this approach would further undermine local food production by creating unfair competition with local farmers, instead of encouraging small agriculture businesses. Donor-funded projects have supported community-based nurseries. Caution is also required to avoid multiplying nurseries in excess of actual demand and ensure that such nurseries are commercially viable and sustainable beyond project completions.

30. **There is limited production of compost, and it is constrained by access to manure.** Sufficient quantities of compost are needed to improve soil fertility over larger areas. Where manual production of compost becomes a challenge, shredders or chippers that can process organic material such as coconut husks, fallen coconut tree trunks or woody shrubs become a necessity. Manure is another important ingredient required to expand the availability of nutritive compost, but it is constrained by the absence of pig pens that would facilitate manure collection.

31. **Importing agricultural inputs is constrained by limited regional transport and inadequate capacities to ensure biosecurity.** Kiribati has banned chemical pesticides and fertilizers to protect the freshwater lens of the coral atoll (FAO, 2011; Paul, 2020). Other inputs required to develop food production are currently difficult to access. Limited regional transport, combined with the staffing constraints of MELAD's bio-security section, limit the variety and quantity of agricultural inputs reaching Kiribati. This leads to shortages in planting materials, such as seeds for exotic vegetables, organic fertilizers, tools, livestock breeds and livestock feed (MELAD, 2020). Biosecurity arrangements have been modelled on Australia and New Zealand, and so may not be fit for purpose. While biosecurity is vital to safeguard Kiribati's fragile agroecological systems and prevent disruptions caused by invasive pests and diseases, there is a need to enhance the capacity of MELAD's bio-security section and streamline processes (MELAD, 2020).

32. **Agriculture Assistants have limited outreach to farmers.** Scaling up production in rural Outer Islands requires farmers to have access to agricultural knowledge and skills to effectively implement new technologies. Currently, 20 Agriculture Assistants paid by MELAD's Agriculture and Livestock Department (ALD) are stationed across the 22 rural Outer Islands. They are responsible for promoting both coconut replanting and the production of food crops. While they have varying technical capacities, a general constraint is their restricted annual operation budget, which severely limits outreach and support activities for farmers. Donor-financed projects and NGOs play a significant role in delivering extension services, but limited post-project sustainability suggests that more effective coordination and knowledge sharing is needed. In some islands, Agriculture Assistants also lack accommodation, impacting their ability to remain present on the island.

2.3 Food supply chains are underdeveloped due to limited farmer linkages, insufficient storage, expensive shipping, and lack of financing

a. Limited vertical and horizontal linkages restrict farmers' access to urban markets

33. **Farmers lack critical information to tap into urban markets.** Despite a robust demand in South Tarawa for fresh produce sourced from the Outer Islands, farmers are unaware of market opportunities, quality requirements, potential buyers, or market prices. The absence of market information deters farmers from investing their time and effort in expanding food production.

34. **Middlemen serve as the primary conduit for connecting rural producers to urban markets.** Farmers in the Outer Islands are scattered, produce very low volumes of surplus, and have a general lack of awareness on market opportunities and requirements in South Tarawa. In such a context, middlemen provide a critical link between farmers and the urban markets. Operating in various capacities, such as independent operators, retailer agents or shipping agents, they are responsible for most of the collection, aggregation, shipment organization and commercialization of food products from the Outer Islands to South Tarawa. They buy produce in bulk, offering little incentive to farmers for investing in higher quality or better organization. Middlemen are often held responsible for the high prices of local produce in South Tarawa, while pressuring farmers into accepting low prices, which may constitute an additional factor discouraging farmers from selling food crops. The lack of value chain analysis hinders the understanding of how costs value-added are distributed along the supply chain. Nonetheless, middlemen

typically bear high transportation costs and the full risk of produce losses from the farm gate to South Tarawa urban markets. Some island councils, such as in Butaritari, Makari, Abaiang, are also reported to levy fees on middlemen's trade, adding to costs and reportedly discouraging middlemen to trade.

35. **With a few exceptions, there is an absence of farmers' organizations for food production and marketing.** In the absence of collective organization, farmers are compelled to market small quantities of produce at the farmgate and accept low prices offered by middlemen. Farmers' organizations could take charge of consolidating large volumes of produce, negotiate better prices with middlemen, or even market directly. They could also provide services to members to address common challenges (e.g., buying plant material, or managing common facilities) and facilitate access to extension. According to a 2019 review of the cooperative legislation in Kiribati, there are 300 cooperatives in operation across the 22 islands, with a collective membership of close to 10,000 (ICA-AP, 2019). Of these, 194 primarily focus on the marketing of copra, 11 are involved in farming, and 2 in livestock raising. The report however underlines that cooperative's lack of capacity, knowledge and skills is an ongoing reason for cooperative failure in Kiribati. Interviews and the review of literature carried out for this study have not found mention of cooperatives involved in crop aggregation or marketing that would offer an alternative to middlemen. However, a few farmers organizations offer interesting models for facilitating farmers' access to markets. They are reviewed in section 4.

b. Lack of storage and poor handling generate high post-harvest losses

36. **High post-harvest losses occur at every stage of the supply chain.** For example, losses ranging from 20 to 30 percent have been reported in the supply of pumpkins from Abaiang to South Tarawa (Manley, 2018; ACIAR 2020). Losses stem from a lack of cleaning and packing at farm level, to inadequate inter-island transport, absence of storage facilities at ports, lack of dedicated cargo space for fresh produce on boats, and lack of cold storage on vessels and in markets. Additionally, there is a general lack of knowledge along the supply chain regarding post-harvest handling, and preservation techniques. These losses contribute to poor quality and high prices on the South Tarawa markets, where local fresh products remain unaffordable for many residents. Furthermore, they reduce the confidence of farmers and traders to reliably supply the market and obtain suitable returns on their investments (Manley, 2018).

c. Shipping is irregular and costly

37. **Limited and irregular transport constrains the range of products that the Outer Islands can supply to South Tarawa.** Domestic shipping is ensured by two vessels operated by government-owned Kiribati Shipping Services Ltd (KSSL), that provide monthly shipping services to all islands in the Gilbert Group. In addition there are four private shipping companies with the capability to transport containers, and smaller operators handling both cargo and passenger transport within the islands (GoK, 2024). Several wholesalers and retailers also operate integrated businesses and manage their own shipment operations. Closer islands to South Tarawa, such as North Tarawa and Abaiang have regular daily ship traffic and can deliver fresh produce, or even cooked local food, to clients in South Tarawa every day (UNCTAD, 2020). More distant islands, lacking direct connections to the capital with limited and irregular service, are restricted to trading food crops with extended shelf lives that can tolerate the long sea voyage. A roundtrip to the Line and Phoenix islands, including Kiritimati, takes a minimum of four weeks, with frequent delays in schedules (GoK, 2024), rendering them unsuitable for marketing any fresh product. To address the issue, the island councils of Butaritari and Makin have established their own shipping lines. The Butaritari ship, acquired in 2019 and operated on a commercial basis, has proven successful, leading the council to purchase a second vessel.

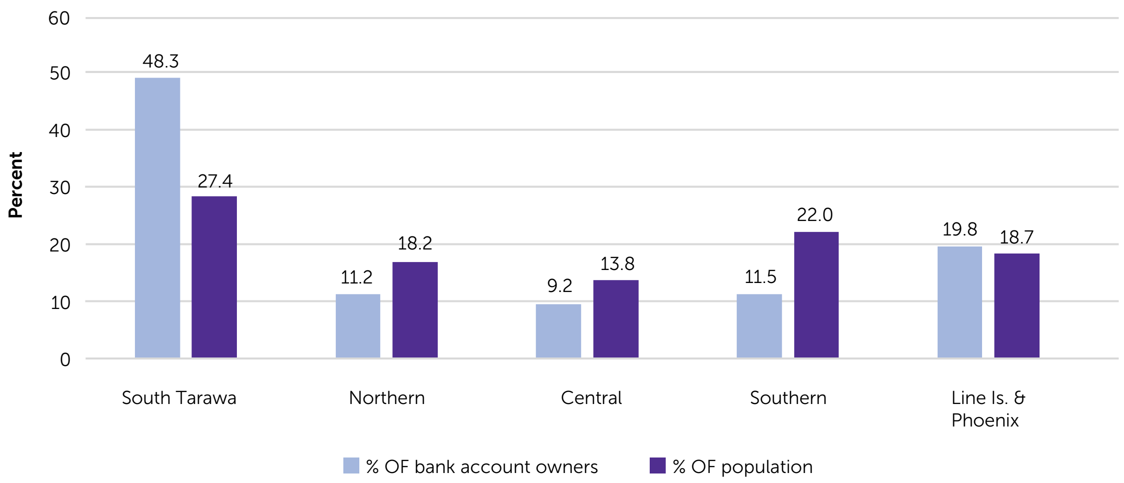
38. **Access to the Outer Islands is further challenged by inadequate port infrastructure and poor intra-island connections.** In most islands, ports or shipping points are narrow channels cut through the reef-flat, lacking wharves, ramps and cargo-handling facilities and equipment. Ships have to offload passengers and cargoes onto small motorboats, a risky process that can lead to casualties and cargo losses. Furthermore, the absence of storage facilities at ports leaves food crops vulnerable to spoilage when ships fail to arrive on schedule. Land transport infrastructure is inadequate on many Outer Islands, and road maintenance is under-funded.

39. **Small volumes and long distances translate into high transport costs, which are only partially offset by the freight subsidy because of difficulties in accessing payment.** In addition to long distances, small and irregular transport volumes result in many sea and air routes not being commercially sustainable. Islands situated along unprofitable routes are generally underserved (Utz, 2021). The Import and Freight Levy Fund, established prior to independence, aims to subsidize freight costs for items transported to and from the Outer Islands. It is funded through an import tax levied on all commercial goods imported into Kiribati. Administered by the Ministry of Finance and Economic Development, the subsidy is provided as a reimbursement of actual freight costs, capped at approved freight rates of the Kiribati Shipping Company Ltd. Initially, the freight subsidy covered a limited range of eligible food crops. In 2019 the government extended the subsidy to cover the entire transport cost for all food crops, to expand the supply and lower the price of Outer Islands produce in South Tarawa. However, the application process limits the number of beneficiaries and so in practice does not lower shipping costs from the Outer Islands. Firstly, the requirement to pre-pay shipping costs necessitates working capital, placing it beyond the reach of many small traders, middlemen, or farmers' organizations. Second, reimbursement procedures are cumbersome, including the requirement to come to Tarawa to be paid. Lastly, many shippers do not issue receipts for transporting cargo, complicating the verification process, and preventing payments from being processed (Rimon, 2020). Insufficient access to the freight subsidy likely contributes to high prices on South Tarawa markets. While airfreight may offer an alternative for transporting high-value fresh vegetables and fruits in some cases, only 50 percent of airfreight costs are eligible for reimbursement from the Freight Levy Fund.

d. Financial inclusion is limited, especially in the Outer Islands

40. **Less than 15 percent of the population is financially included.** The financial sector in Kiribati essentially consists in one commercial bank, ANZ Kiribati, along with two public financial institutions, the Development Bank of Kiribati (DBK) and the Kiribati Provident Fund, and credit unions. Only 15 percent of the population hold a bank account, largely concentrated in South Tarawa and Kiritimati Island (UNCDF, 2018; IMF, 2023a) (Figure 12). Most bank accounts are registered with ANZ, which is piloting a large expansion of online accounts to help with distributing social protection payments. M-PAiSA, a Vodafone mobile money service, is also present in the country. Over half of the population is covered by at least a 4G mobile network (SPC, 2019) and about one third of households in the Outer Islands utilize mobile phones, with the exception of Line and Phoenix Islands (GoK, 2020). The Outer Islands (except Kiritimati) rely heavily on island councils as financial access points including for copra subsidy payments, social welfare payments, and tax collection (UNCDF, 2018). Financial services are largely deposit and withdrawals services. Only ANZ bank offers a savings product, as well as mobile phone services and electronic funds transfer at point of sale (EFTPOs) services. Other providers extend loan services. DBK and the credit unions rely on government funding, which entails a major challenge in raising sufficient capital for lending (UNCDF, 2018).

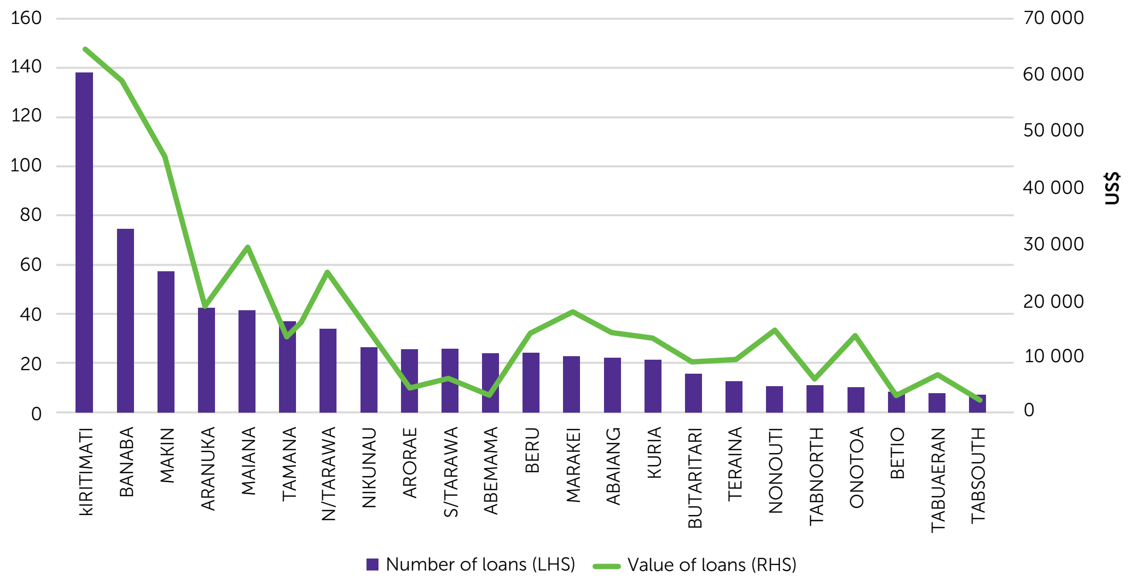
FIGURE 12. *Household's acces to a bank account by geographical location*



Source: GoK, 2020.

41. **Access to commercial loans in the primary sector is hampered by limited access and funding, insufficient collateral, and low financial literacy.** While South Pacific Business Development, the main microfinance institution in the Pacific, is planning to expand to Kiribati, DBK is currently the sole source of bank credit in the Outer Islands. Rural Support Loans to farmers covering both working capital and investment are financed from a revolving fund established with government funding with a 20 percent default rate. Over 2021-2023, DBK extended 517 Rural Support Loans for a total value of US$829,168, covering fishing, copra cutting and farming, vegetable farming, trading stores, and handicraft making. The current portfolio amounts to US$405,380 for 698 loans, or an average loan size of US$581. Kiritimati benefits the most, with 20 percent of the total number of loans and 16 percent of the total value of the portfolio (Figure 13). The high default rate may indicate a poor risk assessment by DBK, insufficient financial literacy of farmers, and inadequate terms for agricultural activities. For example, the Rural Support Loan available to farmers has a maximum duration of two years, well below the 10 years required for a coconut tree to reach full production. Other constraints to access funds are the lack of collateral and credit history, a lengthy recovery process in cases of default where the collateral is a land title or a land lease, lack of financial education and high requirements for loans (UNCDF, 2018; ADB Finance). The Trading Store Loan is mainly utilized by middlemen, with 913 loans extended in the last three years and a total portfolio of US$1.11 million, or an average loan size of US$1,215 (DBK data, 2024). The default rate is lower than 5 percent.

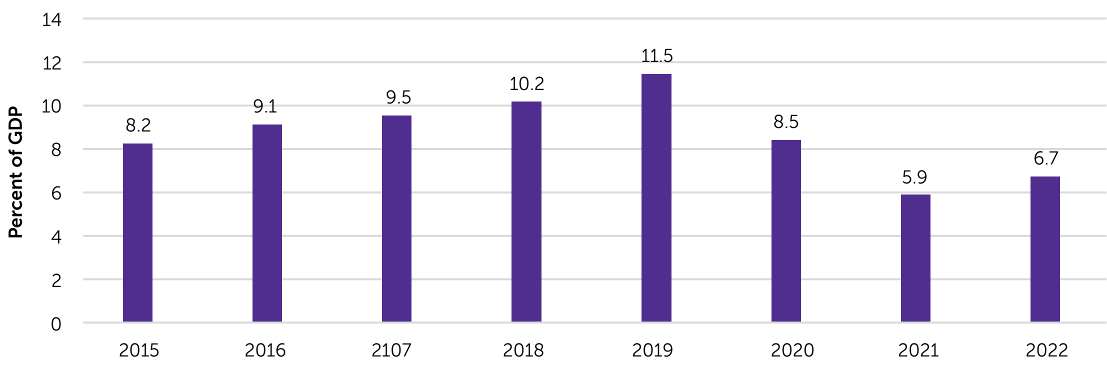
FIGURE 13. *Number of outstanding Rural Support Loans and value in January 2024*



Source: Development Bank of Kiribati.

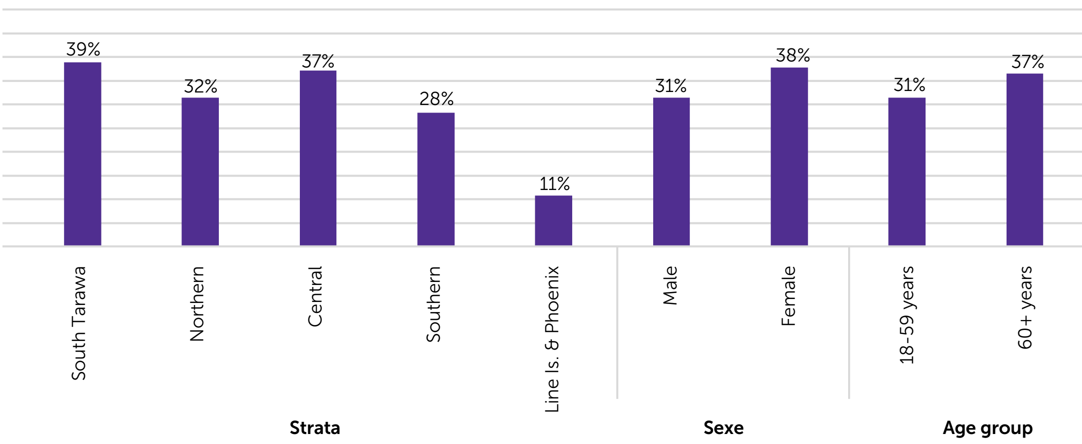
42. **Substantial remittances present opportunities for investing in agriculture.** Following a decline in 2021, the flow of international remittances has rebounded, reaching close to 7 percent of the GDP in 2022 (Figure 14). This growth is driven by seafarers and temporary workers in New Zealand and in the Pacific Australia Labor Mobility, of which Kiribati is the largest participating country. In 2019, it was estimated that one third of households received cash remittances, including both international and national remittances (Figure 15). Remittances offer opportunities for investment in small-scale businesses, including in rural areas. They could be used more productively if the cost of sending remittances was lowered, and if better information was available on suitable investment opportunities (UNCTAD, 2019).

FIGURE 14. *International remittances as percent of GDP*



Source: World Bank, 2024.

FIGURE 15. *Percentage of households receiving international and national remittances*



Source: GoK, 2020.

2.4 There is a high demand for local fresh produce in South Tarawa but market linkages are weak

43. **Fresh fruits and vegetables in South Tarawa come from three main sources.** South Tarawa farms supply perishable and high-value vegetables such as tomato, cucumber, eggplants, lettuce. Outer Islands farms supply transportable root crops (sweet potato, taro, cassava), coconut, and fruits and vegetables such as breadfruit, pumpkin, cabbage, pandanus, pawpaw, banana. The main suppliers are North Tarawa and Abaiang, with increasing production from Butaritari and Marakei. Imports from Australia and New Zealand supply brown and red onions, garlic, carrots, English potato, apples, pears, kiwi, grapes and oranges; while Vanuatu supplies frozen taro and cassava.

44. **Observations point to a significant demand for local fresh produce in South Tarawa, but a thorough assessment is needed.** According to an estimation carried out by ACIAR (2020), the potential demand from South Tarawa wholesalers and retailers for cassava, cucumber, pumpkins, tomato and cabbages from the Outer Islands could reach 1 ton per week (Halavatau, 2017). With regular supplies it could grow to 5 tons of assorted vegetables. With an estimated annual population growth rate of 1.8 percent (World Bank, 2024) and the current estimated average waste rate of 25 percent, this would represent 368 tons per annum that would have to be produced by farmers to meet that particular segment of the total demand for fresh produce in South Tarawa. The high prices of local vegetables in South Tarawa further underscore the strong demand, although they also reflect the high costs and risks associated with transporting produce from the Outer Islands. The increase in households cultivating exotic varieties of vegetables and fruits since 2015, as reported in the 2020 Housing and Population Census (KNSO, 2021), also suggests there is high demand that prompted farmers to increase production. This indicates that a comprehensive market assessment of informal and formal markets in Kiribati, accounting for demographic change, is essential to develop a strategy for food production and commercialization.

45. **The demand for pigs and poultry is also large.** Imported pigs and poultry currently account for 17.6 percent of food imports, and there is a notable demand for locally produced pigs, often resulting in long waiting periods for purchase in South Tarawa. The logistics for bringing local pigs and poultry to urban markets is challenging, given the lack of cold chain and inadequate shipping infrastructure. There are no slaughtering facilities in Kiribati.

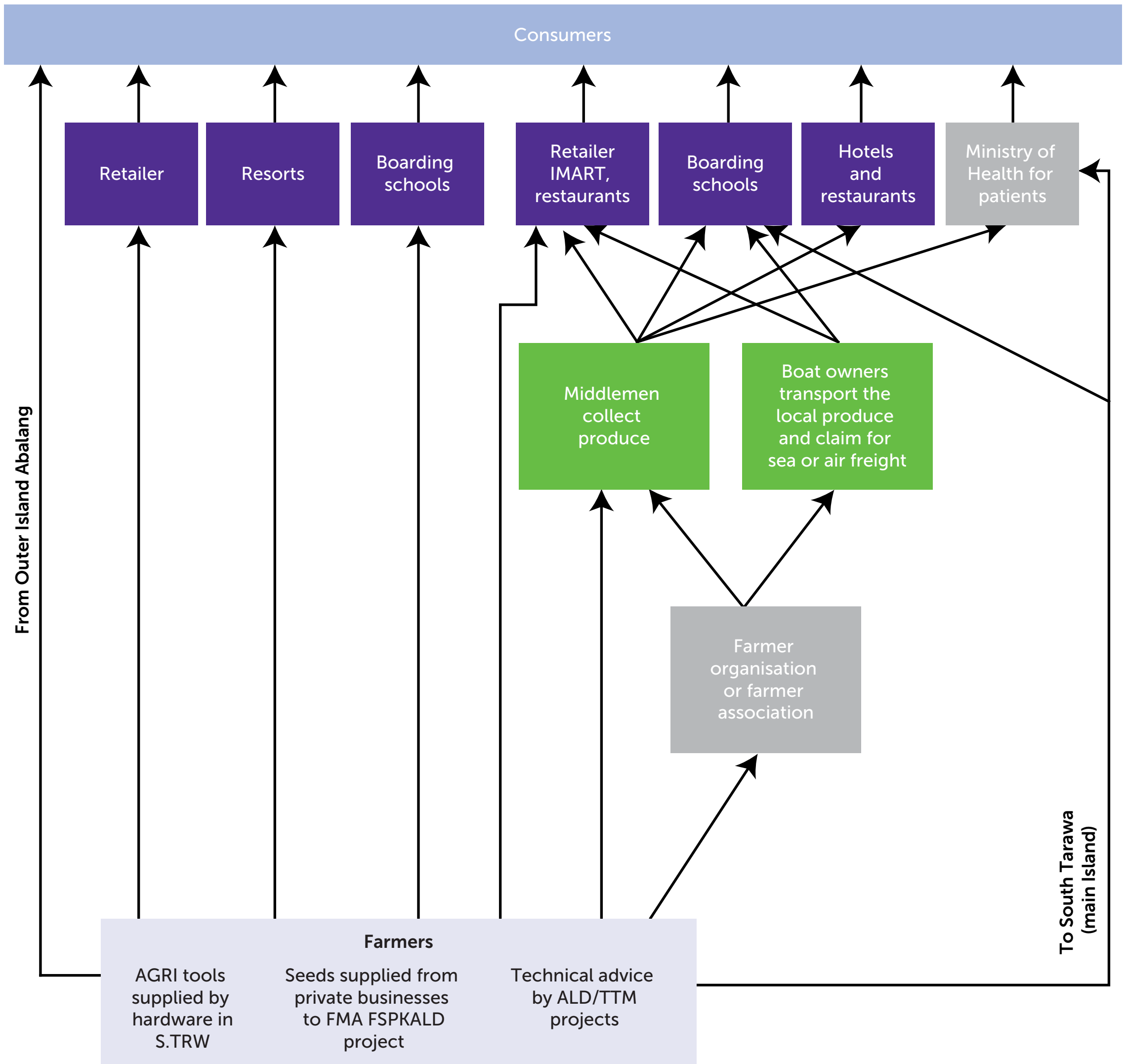
46. **Supply chains for fresh produce from the Outer Islands to South Tarawa are short.** Supply chains from the Outer Islands involve a small number of participants. Farmers either sell their produce to middlemen at the farm gate or transport it by motorcycle or truck to the shipping point, where it is then sold to middlemen or shipping agents. Upon reaching South Tarawa, produce is purchased by sellers operating informal road stalls, or by agents representing formal players including wholesalers and retailers, hotels and restaurants, boarding schools and hospitals. Figure 16 illustrates the value chain for vegetables produced in Abaiang, where part of the farmers is grouped into a registered association, the Abaiang Organic Vegetable Growers' Association, that primarily sells to formal market segments.

47. **Most fresh produce is sold at roadside stalls and local markets.** Currently most Outer Island produce is sold at small roadside stalls across Betio and South Tarawa, as well as at small local markets. The lack of a central market in South Tarawa imposes additional transaction costs on traders, which may deter them from bringing produce from the Outer Islands to sell in urban areas (Manley, 2019). As a response, the government is planning to construct a central wet market in South Tarawa. Local markets in the Outer Islands may also present further opportunities for marketing local produce. While vegetables and fruits are difficult to find in local markets and are more expensive than imported foods, demand is reportedly high (IFAD, 2014).

48. **Formal markets offer good marketing opportunities, but entry barriers for farmers are high.** The modern market segment serves supermarkets and retailers, restaurants, hotels and catering, as well as public institutions procuring food crops such as boarding schools, hospitals, and prisons. There are few examples of arrangements between farmers and stores or restaurants. One significant challenge reported is the delayed payment system, whereas middlemen buy fresh produce in cash (interview with Betarim Rimon, March 2024). Other major obstacles include the limited and inconsistent supply of produce, as well as farmers' lack of access to market and price information, insufficient technical knowledge about quality and food safety standards, and lack of organization for collecting and aggregating produce. On the other hand, traders have limited knowledge in supply chain management.

49. **The School Lunch Program being developed by the Ministry of Education, ALD and the Global Green Growth Institute may open a new, intra-island marketing channel for Outer Islands produce.** The program aims to build the skills of food vendors selling lunch meals to school students, so they can offer a balanced meal in twenty schools across South Tarawa and the Outer Islands. More generally, public institutional markets, such as boarding schools, hospitals and prisons offer large, intra-island marketing potential, which, aside from the Abaiang Farmers' Organization selling pumpkins to the South Tarawa hospital, is largely untapped. By being close to production, these markets could offer reliable and stable market access to farmers, while also decreasing post-harvest losses and reducing dependency on intermediaries for transportation and marketing in Tarawa. Nonetheless, engaging in direct marketing without intermediaries would require farmers to establish effective organizations capable of enforcing quality and procurement standards, aggregating produce and ensuring secure delivery.

FIGURE 16. *Abaiang vegetable value chain map*



Source: Dietershagen and Francis, 2020.

50. **Farmers complain of low prices, but end market prices in South Tarawa are very high.** Local fresh fruits and vegetables are sold at extremely high prices in South Tarawa, reportedly US$ 4 for one cucumber, US$26 for a pumpkin, US$ 53 for a watermelon (interview with KCCI, March 2024). Farmers, in turn, complain about the low prices they receive from middlemen. Prices for horticulture products on wholesale and retail markets are not systematically collected, nor do smallholders keep records of their production costs or sales, and data on price structuring and margins is not available. High prices to consumers can however be attributed to low supplies and high demand scenario, as well as weak cooperation between farmers and the middlemen (GoK, 2024). Other factors are the high cost of shipping and ineffective freight subsidy, and middlemen's risk of losing produce to late shipping or poor handling and then defaulting on their working capital loans. Ultimately, it is the fragility and lack of organization of the whole fresh produce supply chain that translate into the high prices practiced in South Tarawa.

3. The goal

Diversify agriculture in the Outer Islands to improve economic opportunities, food and nutrition security, gender equity, and resilience to shocks

51. **The government of Kiribati has long recognized the importance of diversifying the agriculture sector.** For over three decades government policies and the strategic priorities of the Ministry of Environment, Land and Agriculture (MELAD) have aimed to increase the production of local food crops for domestic consumption (GoK, 2024). The current Kiribati Agriculture Strategy 2020-2030 calls for a "nation-wide re-engagement in agricultural production to increase national and household incomes, reduce poverty and ensure food security, improved nutrition and health standards, and biosecurity for Kiribati and its people" (MELAD, 2020). The 2021 National Food Systems Dialogue brought together both public and private stakeholders and recognized that the constraints on agriculture development were well known. To improve Kiribati's food systems, it stressed that government programs and budgets needed to be expanded, and listed priorities for improving production, market access and public awareness on the benefits of nutritious food (GoK, n.d., a). Most recently, the Food and Nutrition Security Policy 2024-2030 set the global goal of transforming the Kiribati food systems, to become self-sufficient in local, safe and nutritious food and reduce dependence on imports. Key targets set by the strategy include more than 50% of household food expenditure on locally produced food; prevalence of underweight, wasted and stunted children under five years of age of maximum 5 percent; maximum 50% of the population overweight; and ratio of food imports/total imports of maximum 15 percent.

52. **Population growth and urbanization are making food and nutrition less secure.** By 2055, the total population of Kiribati is set to double compared to 2020, reaching an estimated 182,655 individuals, with 67 percent expected to live in South Tarawa (Figure 17). By 2030 already, it is estimated that Kiribati will need 50 percent more food to feed its population (MELAD, 2020). The rapid population growth inexorably drives up demand for food products, exacerbating existing challenges in food production and further amplifying reliance on food imports. Enhancing food production in the Outer Islands and bolstering food supply chains to urban markets are essential for ensuring a food-secure and healthy Kiribati.

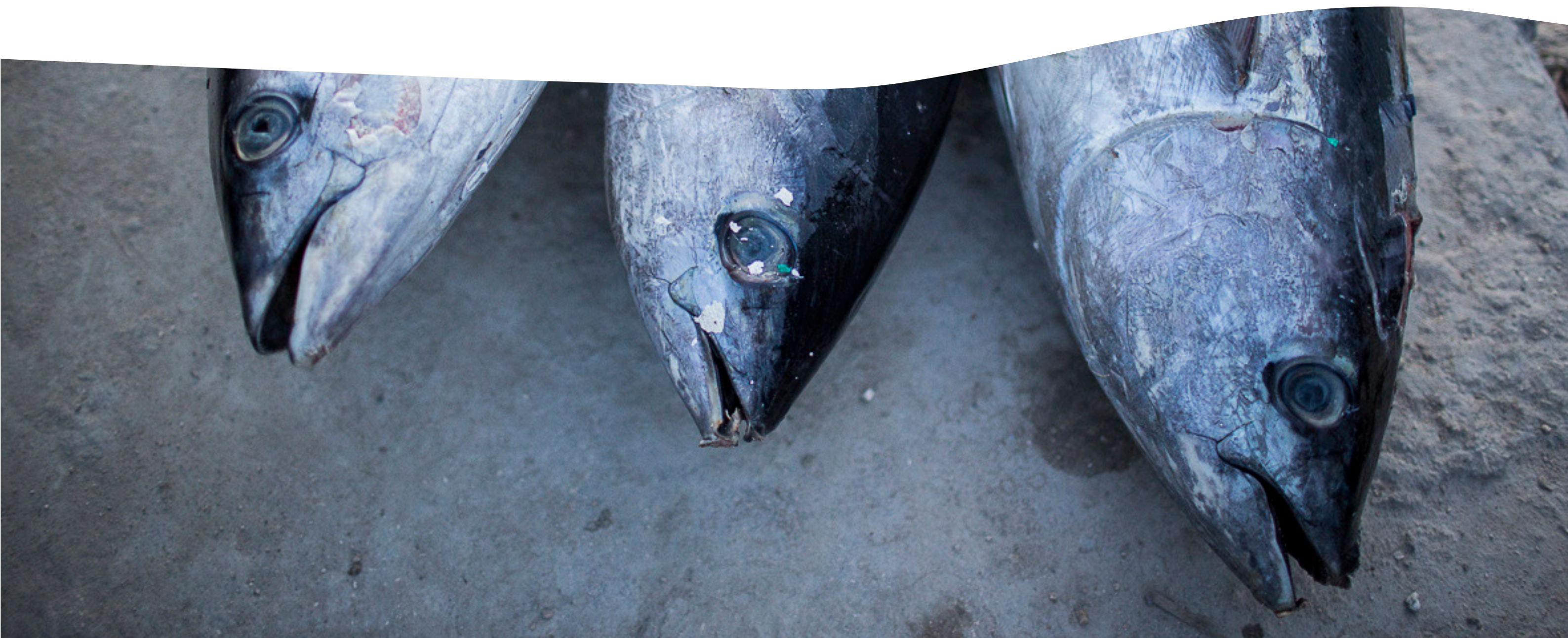
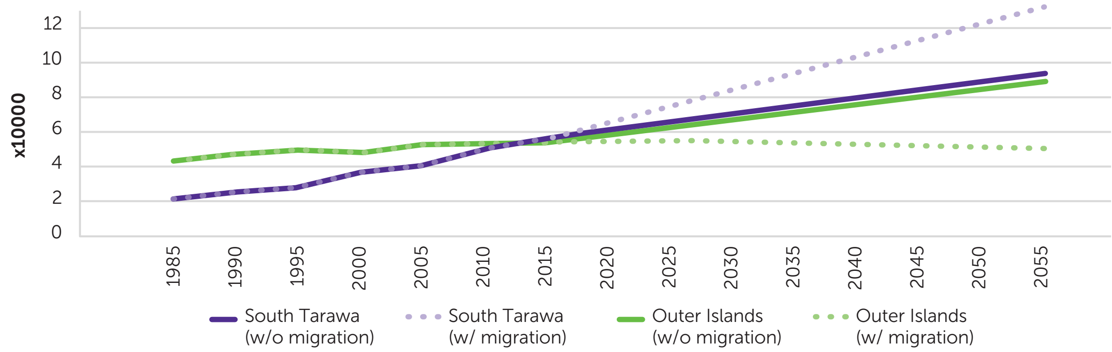


FIGURE 17. *Kiribati population projections with and without migration*



Source: Utz, 2021.

53. **Improved food supply chains are crucial to enhance food and nutrition security, generate income for Outer Island farmers and improve resilience to shocks.** Kiribati's limited land area and soil quality will necessitate the continued importation of grains, including rice. However, enhancing the production and marketing of local food crops is crucial for improving the consumption of nutrient-dense food crops and for diversifying diets. The transformation of agri-food systems will also improve the income of Outer Islands' households and broaden their economic opportunities by facilitating farmers' access to remunerative food markets so that they can capture the opportunities offered by the growing and diversifying demand for food-based products, but also by prompting the creation of new support services, such as nurseries, input dealing or storage, and the development of food processing. New, profitable activities in the agri-based sector should help in retaining population in the rural areas. Agricultural diversification would also contribute to mitigating the risks associated with price volatility and climate variability.

54. **While the challenges are well known and the strategic directions are clear, results have been disappointing.** Despite widespread consensus on the most critical challenges and general strategies for bolstering agriculture and fostering production for domestic markets, progress has been limited. Incentives for farmers and traders have been insufficient to shift from subsistence to market-driven agriculture and to mitigate production, transport and marketing challenges. Meanwhile, the copra subsidy has acted as a disincentive, discouraging farming households from diversifying away from copra production towards cultivating food crops for domestic consumption.

55. **A consistent mix of incentives and public investments is required to address the multifaceted challenges of improving food production and commercialization.** Reducing the copra subsidy would signal government support for diversification and would allow part of the savings to be redirected towards initiatives for improving food production and commercialization. In addition, a coordinated and prioritized set of initiatives is required to overcome multiple challenges for improving farm production, building resilience to climate change, reducing post-harvest losses, optimizing shipping logistics, fostering market connections and facilitating access to financial services. This necessitates improving incentives to engage farming households and stakeholders in the food sector, stimulate private investment, and fund infrastructure, technology, and capacity building programs through public investments.

4. The path

To achieve diversification, Kiribati could reduce the copra subsidy, strengthen agriculture support services and access to inputs, improve food supply chains and consolidate market demand

56. **Reducing the copra subsidy would not only save funds but also leave space to develop other crops that meet domestic market demand.** Redirecting some of the savings towards targeted social protection, strengthening access to inputs and other support services, improving supply chain efficiency, and stimulating demand would further diversify agriculture and leverage sector growth.

4.1 Reduce the copra subsidy to stimulate food production

57. **Reducing the copra subsidy would leave more space to develop food crops that are in demand on domestic markets.** While reducing the copra subsidy is not a sufficient pre-condition for farmers to access domestic food markets, it is a necessary one. Reducing the subsidy would support diversification by allowing farming households to allocate their resources to grow a broader range of crops, provided they can achieve profitable returns from their labor investment justifying shifting from coconut production to more diversified farming.

58. **Any changes to the size of the subsidy would need to be coupled with complementary measures to transform food production and marketing.** Reducing the subsidy must be carefully managed to ensure that it effectively enables farming households to shift towards producing food crops for the market. This would call for complementary measures aimed at improving access to services for increased food production, productivity and climate resilience. The gradual reduction of the subsidy could initially target islands that could more easily convert to other crops, because they are less reliant on copra, are closer to markets (such as Kiritimati and Gilbert Islands closer to South Tarawa) or have better agro-ecological conditions (Northern Gilbert Islands). The efficiency of the copra value chain can also be improved, as outlined in the companion study on reforming the coconut industry (World Bank, 2024c).

59. **Some of the fiscal space created from reducing the copra subsidy could be redirected to support food supply chains.** Implementing a comprehensive program for promoting food crop intensification and commercialization will require financial resources. ALD currently struggles with limited budgets for extension and entirely relies on donor contributions for investment financing. Redirecting part of the public resources currently allocated to the copra subsidy would strengthen agriculture support services, improve post-harvest management and develop productive assets. This could build on proven technologies developed by the Australian Center for International Agricultural Research (ACIAR) that are available for dissemination (see Box 1).

60. **Budget savings could also finance cash transfers to vulnerable households.** Establishing a targeted cash transfer program before the copra subsidy is reduced would compliment efforts to expand food production, and provide a safety net for vulnerable households. Targeted cash transfers would allow the government to both reduce poverty and save money at the same time (World Bank, 2024b).

4.2 Strengthen agriculture support services

a. Adopt proven technologies to sustainably increase productivity

61. **Proven, low-cost technical solutions are available to cultivate food crops in Kiribati's challenging agroecological environment.** Technological packages for fertility improvement and climate resilience have been developed, tested and documented by a range of projects including ACIAR (2020). These initiatives have demonstrated that by applying appropriate soil and pest management strategies, starchy staple foods as well as nutritious foods can be sustainably cultivated in Kiribati's outer islands.

62. **These technologies have been trialed in several donor-funded projects.** The approach has been replicated by IFAD-financed *Kiribati Outer Islands Food and Water Project* (KOIFWAP, 2014-2023) in the Southern Islands and is further been scaled up with the Small Islands Food and Water Project (SIFWAP), a regional project that includes Kiribati and is implemented by IFAD and FAO, with financing from the Global Agriculture and Food Security Program (GAFSP). Similar approaches have also been developed by two other initiatives. The *Kiribati Enhancing National Food Security in the Context of Climate Change Project* (2016-2022) financed by the Global Environment Fund and UNDP promoted native, perennial crops that can better withstand salt-water intrusion. *Atoll Food Futures* (2019-2025) is financed by the Australian Department of Foreign Affairs and Trade (DFAT) and implemented by Live and Learn. The project supports the production of vegetables through climate-smart agriculture technologies, such as improved water management, composting and natural pest management, as well as dietary diversity. In Kiritimati, an organic commercial-scale agricultural farm established on a former mining site has demonstrated how food crops can grow through permaculture and regenerative techniques involving targeted composting, water management using old mine pits, agro-forestry and greenhouse production. Key elements are common to the technological packages applied by the various projects. These are: (i) planting diversified, nutritious crops as identified by the ACIAR project (Box 1); (ii) improving soil health and retaining water, using tailored compost from locally available materials that address soil deficiencies (Box 2); (iii) using natural fertilizers; (iv) managing pests naturally; (v) managing water; and (vi) implementing agroforestry systems associating indigenous trees with food crops and small livestock.

BOX 1. *Nutritious leafy vegetables can improve nutrition security*

ACIAR-financed project Improving Soil Health, Agricultural Productivity and Food Security on Atolls was implemented from 2015 to 2020 in Kiribati Outer Islands was a pioneer in promoting the production and consumption of local nutritious foods. The project identified twelve indigenous leafy food plants that can thrive in the atoll environment and that are highly nutritious, tolerate alkaline soils, salt and drought, are easy to grow, prepare and cook, and taste good. While they can be found in local gardens and hedges, they are usually used for animal feed or as ornamentals. These leafy food plants are:

- Te mota (wild *Amaranthus*)
- Chaya (*Cnidoscolus aconitifolius*)
- Drumstick (*Moringa oleifera*)
- Hedge panax (*Polyscias scutellaria*)
- Ofega (*Pseuderanthemum whartonianum P. Carruthersii*)
- Beach cowpea (*Vigna marina*)
- Kangkong (*Ipomoea aquatica, Ipomoea reptans*)
- Cucurbits (pumpkin and choko)
- Bele (*Abelmoschos manihot*)
- Chili (*Capsicum spp*)
- Purslane (*Portulaca oleracea*).

Twelve factsheets were produced, describing the uses of each vegetable along with threats, nutritional benefits and methods for production, harvest and post-harvest. Additionally, cultivar of root crops (sweet potatoes, taro, cassava) best adapted to some of the outer islands were selected from locally available germplasm. Exotic vegetables like cabbage, tomato, eggplant, beans, lettuce and carrot were also promoted as nutritious foods.

The project also developed adapted compost recipes for increased productivity (see Box 2). It diagnosed key pests and diseases that posed risks to the cultivation of the recommended crops, promoted Integrated Pest Management practices, and established a Kiribati Plant Health WhatsApp group to support pest and disease diagnosis.

Source: ACIAR, 2020.

63. **Market-oriented production will require scaling up successfully tested adapted technologies.** These innovative initiatives were primarily designed to enhance family nutrition through home gardening and have been implemented on a small scale. ACIAR had plans to test commercialization but, because of various delays, was not able to go beyond sending trial shipments to South Tarawa. The challenge is therefore to expand farmers' adoption of innovative technologies, both at the farm level, with larger plots, and at community or island level, with larger number of farmers producing for the market and generating bigger volumes.

64. **Critical factors of success to support upscaling are in place or can easily be supported.** Tailored composting has now been successfully developed in a range of islands that well represent the diversity of agroecological conditions in the country. If required soil and water testing can easily be performed with readily available testing kits. Alternatively, samples could be sent to the Fiji Agricultural Chemistry Laboratory. Extension materials were developed by various projects to support the adoption of technological packages. These constitute an excellent basis for upgrading the skills of ALD extensionists and for supporting dissemination to farmers. Finally, projects, but also NGOs, farmers' organizations and other grassroot organizations could be key partners of ALD extensions in promoting the adoption of new technologies.

BOX 2. *Local composting methods can supply plant nutrients, and buffer against drought, salinity and high soil acidity*

Soils in Kiribati are low in organic matter and nutrients. The ACIAR project developed enhanced compost recipes, providing a richer growing medium for improving local vegetable production, and only using locally available ingredients such as yellow beach pea, specific leafy plants, coconut husk and shell, poultry manure, fish meal, sea cucumber and seaweed.

Rather than making compost with whatever biomass is available, a more targeted approach was taken. For example, mineral analyses of yellow beach pea (*Vigna marina*: te kitoko) and chaya (*Cnidoscolus aconitifolius*; te tiaia) consistently showed high levels of iron in their leaves, which should be used in making compost for soils that are iron-deficient. For this work, over 200 samples of potential compost ingredients (leaves, algae, ash, pig manure, and mud) were collected in the atoll islands and analyzed for their nutrient content in Australia. Results from the analyses guided the formulation of targeted compost recipes. A summary of the results was compiled into a factsheet: *Nutritious leafy plants: also valuable for soil health.*

Compost making facilities were also supported to provide sufficient compost to support sustainable production of vegetables and fruit, and trials allowed to develop application methods that resulted in the highest yields.

Source: ACIAR, 2019 and ACIAR, 2020.

65. **Agricultural promotion tends to work best when it targets communities as a whole and is associated with nutrition education.** Pioneer projects have shown that targeting the whole community and supporting food production for home consumption contributes to successfully moving into market production. Building on their approaches, new technology promotion should be led by ALD Agriculture Assistants, in partnership with Island Councils, traditional authorities and groups such as church, women and youth groups. The participation of Island Council Women's Development Officer, in partnership with the Ministry of Women, Youth and Social Affairs, would help in ensuring women's participation and empowerment. To create awareness about health benefits, but also to stimulate demand in local markets and contribute to the growth of local food systems, farmers' skills development could combine good agriculture practices and nutrition education. This would cover basic nutrition concepts, healthy diets, preparation and preservation of indigenous crops, and utilization of income for healthy food choices, as developed under Section 4.4.

b. Facilitate access to inputs and productive assets

66. **Access to climate-adapted seedlings could be expanded by encouraging private sector nurseries.** The production of a larger variety of seedlings adapted to the islands agroecological specificities' must be increased, in line with household needs and market demand. A nursery assessment would help in identifying the current production capacity, including ALD-managed island nurseries and community nurseries set by development projects. Where increased capacity is needed, commercial nurseries would generate local employment. It is important to make sure that new nurseries have sufficient activity to be commercially viable. This will also require revising the policy at ALD-run nurseries. These nurseries provide a valuable service in small islands, where commercial nurseries would not be viable. However, in islands where demand could ensure commercial viability, ALD nurseries crowd out potential private sector initiatives, including farmers', by generating unfair competition by charging a subsidized price. ALD's role is better positioned to assist rather than replace farmers. The proposed nursery assessment would be expected to clarify in which islands and under what conditions could viable, privately-owned nurseries be developed. Additionally, community-based seed banks could be established to improve local seed availability and enhance farmers' resilience to climate shocks.

67. **Innovative options are available to expand access to organic inputs.** ***Insect farming*** is a rapidly emerging technology globally, especially in Africa, whereby biowaste is recycled back into farming systems. In Kiribati, field waste (e.g. copra waste), crop residues unfit for tailored composting, and food waste could be converted into a novel source of protein for pigs, poultry and fish as well as a new source of organic fertilizer. Promising preliminary work has been engaged by the Papua New Guinea National Agriculture Research Institute with rearing Black Soldier Fly (BSF) larvae (Roberts and Dom, 2022). These can digest almost any organic matter, including wastes high in alkaloids or other compounds that are not suitable for composting, and they do not accumulate toxins (Shelomi, 2020). Native BSF are found in Kiribati, but research is needed to determine the ideal parameters of a BSF facility for processing local wastes into feed and fertilizers, as well as to check the feasibility and acceptability of different BSF program scales (Shelomi, 2020). ***Seaweed,*** an abundant bioresource, can be used for composting as well as for the production of fertilizers. In addition to being an ingredient for tailored composting (Box 2), seaweed was also tested as the main ingredient for compost production under ACIAR Diversification of Seaweed Industries in Pacific Island Countries Project (Paul, 2020). The project found that Kiribati's seaweeds can bring nutrients like nitrogen, phosphorus, and potassium that act as slow-release fertilizers. Compost trials were successfully run in Tarawa for the production of tomatoes and cabbages, using *Acantophora*, an abundant beach-wrack seaweed regarded as a waste. Officers of the Ministry of Fisheries and Marine Resources Development were trained in compost production and in running community compost workshops, in collaboration with MELAD. An instruction manual for participants was also produced. Scaling up the production of *Acantophora*-based compost would provide a low-cost fertilizer while also storing carbon in the soil and improving the environmental quality of the coastline.

68. **Increased livestock production could achieve a dual goal: meet market demand and increase manure availability.** Increasing livestock production would provide an additional source of income by meeting the large and unmet market demand for locally produced pigs. It would also increase the availability of animal manure. Additionally, it could generate methane for domestic cooking needs as well as liquid fertilizer through the installation of low-cost biogas digesters, as demonstrated in Tuvalu (Binney, n.d.). However, two challenges require attention to increase production. Firstly, there is limited access to nutritive feed rations which come from KCDL's copra meal pancakes and low volumes of costly imported feed. Research is needed to develop appropriate feed formulas for pigs and poultry using local ingredients as much as possible, including fish meal and copra meal. The latter was traditionally fed to pigs before the copra subsidy absorbed all the production. Second, while pigs need to be enclosed in a pen to facilitate care and the collection of manure, the leaching of manure and urine into the soil must be prevented to avoid groundwater contamination (White et al., 2004). Constructing slabs is an option that may be too costly for keeping a few animals, but could be considered for commercial production of both pigs and manure. Another option is to cover the pen floor with brown leaves that absorb manure and can then be used in composting, as tried out by ACIAR (ACIAR, 2019). However, the biggest challenge may lie in bringing live pigs or pig meat to urban markets, because of the lack of cold chain, adapted shipping lines and facilities, and slaughtering facilities.

69. **Farmers need better access to imported inputs.** Farmers need access to imported inputs (such as seeds for exotic vegetables, organic fertilizers, tools, shade cloth, containers for above ground planting, livestock breeds and livestock feed) on their island in accordance with their needs. This would require streamlining biosecurity processes and beefing up the capacity of the ALD's biosecurity section. Options to establish retail kiosks on the islands where there is more demand could be explored, in partnership with importers in South Tarawa or farmers' organizations. Procurement processes can be constrained by the relatively small demand and limited capacity of local vendors, requiring careful demand forecasting, good collaboration between island retailers to pool orders and with their suppliers, and building capacities

in procurement, stock management and compliance with administrative and biosecurity regulations. ALD might consider harnessing the capacities of the Kiribati Chamber of Commerce and Industry (KCCI) in this respect. Given the long time ban in Kiribati for protecting the reducing freshwater lens, it does not seem feasible to start importing chemical pesticides and fertilizers.

70. **Support is needed to facilitate investment in productive assets**. When the scale of composting grows, shredders or chippers become necessary to process organic material such as fallen coconut tree trunks or woody shrubs. Transport equipment might be required if central composting facilities are installed. Specific equipment is also needed to expand and diversify water supply and conservation systems, such as water tanks and pumps, solar-powered irrigation, desalination equipment, and rainwater harvesting. Chain saws for felling senile coconut trees and digging equipment to remove surface roots are needed to enable intercropping, as suggested below. Financial support will be essential, particularly through blended instruments that combine grants, loans and owners' contributions as proposed under 4.3. The government could finance larger, immovable investments such as water irrigation or desalinization systems. To ensure sustainability, access to financial support for productive assets should require that management systems be established beforehand. These systems could take different forms, such as leasing, concession to private entrepreneurs running services for a fee, management by a farmer organization or water user groups charging usage cost. Lessons are available from previous projects including KOIFWAP (water management by water user groups) and Live and Learn (household-shared water systems). Agreements ensuring that new equipment does not deplete water resources would also be required. More broadly, it may be appropriate to review policies and regulations governing water resource allocation, distribution, and use for agriculture and food production.

c. Address limitations in land availability

71. **Expanding food crops requires simplifying the procedures for securely using public and customary land.** Addressing the constraint of limited land availability for food cropping is critical to scaling up production. As advocated in the companion study on reforming the coconut sector (World Bank, 2024c), expanding farmland will require streamlining the procedures for leasing both public and customary land. Parties leasing customary land will need stronger protections. Specifically on Kiritimati Island, where land is entirely public and constitutes 47 percent of the country's total land area, MELAD would need to develop a zoning plan for the island delineating areas for different uses, including agricultural use. This set of measures, which are further developed in the companion study on reforming the coconut industry, would ensure tenure security and empower farmers to securely invest on their farms.

72. **Maximizing the productivity of current farmland could also allow farm expansion.** Intercropping with coconut trees, possibly with the addition of irrigation, may be an option for expanding the cultivation of food crops while also increasing land revenue. With a high percentage of senile coconuts, extensive replanting is needed to ensure sustainability of the resource (GoK 2020; Atkinson, 2022). Intercropping with short-term crops between the rows of new coconut palms can provide a source of income and food, particularly before the replanted coconuts come into full production (Sheehy and McGregor, 2022). Atoll permaculture or mixed food tree cropping system as implemented in Temotu Province in the Solomon Islands allows multi-story cultivation with many different types of food plants, including large and medium-size fruit and nut trees, shrubs, and shade-adapted root crops (Jansen, 2011).

73. **Hydroponics could also address land limitations as well as poor soil and water scarcity.** Hydroponic farming grows plants without soil, using mineral nutrients in a water solution and maximizing water productivity through recycling. Compared to traditional soil-based cultivation, hydroponics can take up to 80 percent less space and consume 70 percent less water, while

significantly increasing the speed and yield of crop production (FAO, 2022). Simple, cost-effective solutions exist that make the technology accessible to small farmers and low-income families, as demonstrated in water scarce environments such as Jordan or Cabo Verde, in confined spaces such as refugee camps in Kenya or Palestine, and for unemployed youth such as in Nigeria. A successful example of adapting hydroponics to the challenges faced by atoll farmers has been developed in Kiribati as well. A local social enterprise, Te Maeu, promotes hydroponics for improving household food security and nutrition by distributing hydroponics equipment for home-based vegetable gardening. Exploring the feasibility of developing hydroponics applications in the Outer Islands holds would allow leveraging innovative systems to meet local demand for fresh products, create job opportunities, and improve the overall quality of life for the island communities.

d. Strengthen the capacities and role of Agriculture Assistants

74. **ALD staff, with appropriate training, can advise farming households on the adoption of new technologies and on the development of farming as a business.** Capacity building provided to Agriculture Assistants and Nursery Managers would enable them to promote the adoption of the new technologies, advise farming households on opportunities for moving towards market-oriented farming, provide training and coaching on developing farming as a business, and support women's participation and equitable empowerment. Farmer-to-farmer visits to exchange knowledge and good practices, pilot demonstrations and hands-on training would show the feasibility of new technologies and the returns they could bring. Male and female local champions such as lead farmers, community leaders, and youth returned from labor mobilization programs can also help innovations be adopted. For example, "plant doctors" trained at plant health clinics set up periodically at local markets have had proven success in the Pacific (SPC, n.d.). Extension manuals can be developed and shared amongst farming households, building on existing documentation, such as ALD extension, material, Live and Learn manuals and ACIAR factsheets. Social media and digital technologies can also improve access to information. Examples are ACIAR's experience with a Plant Health WhatsApp group that supported pests and disease diagnosis and advice in Kiribati, and with Fiji's Market Information System (PAPP, n.d.).

75. **Partnerships between Agriculture Assistants and the private sector, NGOs and development projects would improve extension outreach and relevance to farmers.** Commercial entities such as middlemen, retailers or KCCI can be precious resources for accessing market information, advice on quality management or market linkages. Farmers' organizations can supply a large range of services to their members, from technical advice to aggregation and marketing, and last mile outreach. NGOs and development projects can help by supporting innovation trials, start-up financing, infrastructure investments and other forms of incentives. The aim is to empower Agriculture Assistants with knowledge and resources, so that they can offer better information and services to farmers, and make short-term development projects more durable.

76. **Women need to be empowered to take advantage of new economic opportunities.** Women head one quarter of agricultural households and already produce the majority of food crops. They will play a critical role in shifting towards food production for the market. A Do No Harm approach is required to prevent women's empowerment initiatives exacerbating gender disparities, gender-based violence, or women's workloads. This will require understanding the gender dynamics in the agriculture sector as well as the collaborative participation of both women and men. Gender and power analyses will be important to assess how gender inequalities affect women's lives, women roles within and outside the household, and violence against women. This would help to develop a household approach for improving food production and

nutrition that involves both women and men (IFAD, 2018). Successful experience in this respect has been gained in Solomon Islands with NGO Kastom Gaden Association, in Vanuatu with the Vanuatu Chamber of Commerce and Industry, and in Papua New Guinea with the Fresh Produce Development Agency (Hill, 2023; Pamphilon, 2017).

4.3 Enhance the efficiency of food supply chains

a. Improve access to market information

77. **Assess the food supply chain.** A Food Supply Chain Assessment is needed to identify market opportunities for Outer Islands farmers and to guide ALD in providing support to develop market linkages. Four main areas need to be addressed. The first area would be the assessment of market demand for Outer Island crops on South Tarawa and on main Outer Islands, including Kiritimati, in terms of volume, quality and food safety standards. The second area would involve the profiling of middlemen and farmers' organizations, to understand the type of support needed to connect farmers to profitable markets. Thirdly, the analysis of price formation and value sharing throughout the supply chain would help to understand why final prices are so high in South Tarawa. Fourthly, the potential for processing local food into more shelf-stable, easily prepared options should be studied. The dissemination of the outcomes of the Food Supply Chain Assessment would help Outer Islands farmers move to market-oriented food production. Study outcomes could also be presented to a Food Consultation gathering food actors and relevant ministries. This would identify possible collaborations, agree on priority areas of support, direct an ALD sector roadmap (Section 5), and continue the multi-stakeholder dialogue from the 2021 National Food Summit (GoK, 2021).

78. **Develop a market information system.** This would support farming households and food supply chain actors make informed decisions about the production, marketing, distribution, and pricing of agricultural products. A rapid online survey would help to identify priority categories of information, such as crop demand and market prices, input supply, or shipping information. Different solutions could also be tried and gradually developed, from simple social media-based groups to a comprehensive system run by the Kiribati Chamber of Commerce and Industry.

b. Promote horizontal and vertical linkages within the food supply chain

79. **Build on existing models to promote farmers' collective action.** Farmers' organizations allow farmers to aggregate bigger volumes and negotiate better prices with buyers. They can also provide members with technical assistance, inputs, quality management and traceability, post-harvest management and market linkages. A few existing organizations offer interesting models (Box 3). They can start with simple agreements to coordinate production, harvesting and consolidation, in line with farmers' objectives and capacities. It would be helpful to analyze existing farmers' organizations in detail, both formal and informal (for example farmers in Butaritari marketing banana to South Tarawa), to identify what has contributed to their success.

80. **Build an improved relationship between middlemen and farmers, based on greater transparency and trust.** Developing sustainable farmers' organizations providing services to members requires time and consistent support. Meanwhile, in most islands, scattered farmers with small volumes of production will still need to rely on middlemen to get their produce to urban markets. Efforts to promote farmers' organizations could therefore be coupled with initiatives aimed at fostering improved relationships between middlemen and farmers, grounded in mutual interests and collaboration. The profiling of different types of middlemen, such as retail agents of Tarawa-based buyers and autonomous traders under the Food Supply Chain Assessment would help identify appropriate support packages. These packages, which could be developed by KCCI, would enhance handling, storage, and transportation to ensure product quality and safety and to reduce losses. Middlemen could also be empowered to provide farmers

with technical assistance for primary collection and aggregation, matching their produce to market demand, and improving on-farm post-harvest management. Particularly where they serve as retail agents within larger structures with greater resources, they could facilitate access to inputs. By delivering a comprehensive set of services to farmers, middlemen would be better positioned to secure larger volumes of traceable and higher-quality produce. However, to build farmers' loyalty and ensure sustainable produce supply, they need to foster fairer relationships with farmers, based on transparency, trust and fair remuneration. Agriculture Assistants could facilitate equitable negotiations, based on actual farm budgets and information from the Food Supply Chain Assessment. In addition to training, middlemen would also require improved access to financing for working capital to purchase produce and packing materials, as well as for investing in refrigerators and small equipment for intra-island transportation. In the Outer Islands, Island Councils need to eliminate fees imposed on middlemen trading on the island.

BOX 3. *Farmers' organizations in Kiribati*

Abaiang Farmers' Organization stands as the only farmer organization in the Outer Islands. Using a household-cluster approach, it promotes organic agriculture and organizes the marketing of organic coconut products and vegetables to South Tarawa markets. Under an IFAD-SPC project implemented by the Pacific Organic and Ethical Trade Community (POETCom), the organization has championed the certification of Abaiang atoll as organic, ensuring compliance with all organic certification requirements and fostering awareness among the local population about organic agriculture. Abaiang Farmers' Organization is linked to the Kiribati Organic Producers for the marketing of coconut products. In South Tarawa, the Tarawan Organic Farming and Marketing Association (TOFMA) sells inputs to farmers and markets their produce through its own store, as well as directly to restaurants, health and educational institutions and ministries. Temwaiku Farmers Organization has similar activities and supplies road-side stalls and shops with fresh produce. Finally, the Kiribati Organic Producers (KOP) is a registered social business enterprise selling organic coconut products supplied by households' groups in the Outer Islands, particularly from Abaiang atoll. It helps communities develop organic products from coconut trees and provides niche markets for virgin coconut oil, coconut sap sugar and coconut syrup. KOP is involved in training and capacity building, value-adding for coconut by-products, quality control, marketing of organic products in Tarawa, and seeking export outlets.

81. **Promote collaborative arrangements that link producers, buyers and the public sector.** Collaborative arrangements usually take the form of contract farming, or a formal or informal agreement specifying the obligations of farmers and buyers as partners in business, whereby farmers commit to supply the volumes and qualities as specified, and the buyers commit to purchase the goods for a specified payment (Will, 2013). Buyers provide embedded services such as delivery of inputs (e.g. seeds, fertilizers, plant protection products), pre-financing of inputs on credit, or other non-financial services (e.g. extension, training, transport and logistics). Such arrangements provide farmers with secure and remunerative market options incentivizing them to produce better-quality crops. Buyers obtain reliable and consistent supply of crops in line with market requirements. Contract farming can take the form of a public-private partnership, whereby the public sector provides financial incentives for the provision of technical assistance, inputs or capital investment. In the Pacific region, notably in Papua New Guinea (PNG), Samoa and Solomon Islands, the World Bank supports productive partnerships (Box 4). There has been limited experience with direct arrangements between farmers and buyers

in Kiribati. Building on the analysis of experience and the identification of lessons learnt, the Food Consultation could explore opportunities and limitations for promoting contract farming between farmers and buyers to supply the South Tarawa market. A positive assessment could give way to piloting collaborative arrangements between food crop producers and buyers suited to the Kiribati context.

82. **Support private sector and farmers' organizations to establish and manage service hubs.** On Abaiang Island, a collection center equipped with solar-powered cold storage and managed by the Abaiang Farmers Association has triggered increased farmers' supply and sales to South Tarawa. The center operates as a multi-service hub extending a range of services to farmers, from aggregation, storing and marketing, to input provision (seedlings) and training to farmers. Similarly, KCCI has expressed interest in promoting private sector-owned service hubs that would contract with farmers to deliver produce. These hubs would also provide support services, including refrigerated transport from farms or aggregation points, dry and cool storage, sorting and packing facilities, and a small input shop. A feasibility study for developing Outer Island private-sector managed hubs is needed. The study would assess revenue streams from selling produce and providing services to farmers and buyers, costs and benefits, financial viability and financing, different types of ownership and operation modalities, and impact on farmers' production and revenues. If positive, public start-up financing would be needed for infrastructure, transport equipment and technical assistance, given the innovative nature of the project.

BOX 4. *Productive partnerships in Papua New Guinea*

The Productive Partnerships in Agriculture Project (PPAP) was cofinanced by the World Bank, IFAD and the Government of PNG, and aimed at improving the livelihoods of smallholder cocoa and coffee producers, mainly through productive partnerships between smallholder farmers and agribusiness for the provision of market access, technologies and services. In this collaborative arrangement, the Department of Agriculture financed sub-projects submitted through a competitive process by agri-businesses partnering with groups of farmers, to enable farmers to upgrade their production capacities in line with market demand. Financial assistance was provided under the form of grants, which were matched by contributions from the farmers and partnering agri-businesses. The final assessment of PPAP found that public-private partnerships were an effective channel for delivering support services to farmers at a much larger scale than what could be achieved by public extension services, while enabling agribusinesses to engage with smallholders and offsetting the risks attached to sourcing from them. The assessment also found that providing improved production technologies to farmers needed to be complemented with market empowerment and measures to ensure farmers' sustainable access to markets and services beyond project completion (World Bank, 2022).

c. Improve post-harvest management

83. **Reduce post-harvest losses to increase supply and contribute to lower prices.** Measures to minimize losses would be best developed in collaboration with farmers, traders and shippers. These would integrate improved storage and transport with enhanced post-harvest practices throughout the supply chain. Farmers and middlemen need training to harvest fruits and vegetables at the proper stage and at peak quality, handle produce gently to avoid damages or contamination during harvesting, sorting and grading, use proper packing equipment (such as vented, stackable, reusable crates), and to understand market requirements. Additionally, providing logistics training to shippers would enhance the preservation of freshness and quality

of produce. This should be complemented by public investment in port infrastructure, and storage at docking facilities and wet markets. In the Outer Islands low-cost, low-energy, environmentally friendly cooling facilities could be investigated, that are made from locally available materials and use evaporative cooling (Ahmed et al., 2021). Finally, a thorough legislative and regulatory framework for enacting the 2006 Food Safety Act and adopting the Codex Alimentarius food standards and codes of practice is also required. This will set transparent and implementable standards for ensuring the safety, quality, and proper handling of food throughout the supply chain.

d. Enhance inter-island connectivity

84. **Improve the efficiency of shipping food crops through a combination of solutions that attract a diverse range of shipping operators.** Making food crops cheaper and more available on South Tarawa markets requires a more reliable and efficient market in inter-island shipping. This can be achieved through a combination of initiatives, in line with the diversity of operators in the sector.

85. **Implement a performance-based franchise shipping scheme for improved connectivity.** ADB supported a performance-based contracting model that was implemented in Solomon Islands and PNG to allow new or more frequent passenger and cargo transport services to poor and remote communities (ADB, 2017). The Franchise Shipping Scheme started in Solomon Islands in 2010. Routes were competitively tendered, with bidders defining their operating costs for the required quality and frequency of services. Operators were paid a monthly subsidy to cover the difference between actual revenues collected and the cost of providing the service as specified in their bids, with no cap on the subsidy. The performance-based contract incentivizes contractors to perform efficiently, as their operating costs for the service form the basis of their proposals. By 2015, seven routes, previously uncovered by regular services, were operating and subsidy requirements had declined on three of these, reflecting increased demand and revenue collection. Most importantly, regular services facilitated trade, allowing farmers and other small businesses owners to transport their goods to buyers on a regular basis. Similar to what happened in PNG, the franchise shipping subsidy in Solomon Islands allowed the government to provide a service at less than half the cost of running its own shipping fleet. The Franchise Shipping Scheme is still being financed by the government of Solomon Islands. A similar scheme could be implemented in Kiribati, with initial support from development assistance. It could be opened private suppliers, as well as KNSL and Island Council-run services.

86. **Leverage South Tarawa retailers trading with the Outer Islands to alleviate transport constraints.** Several retailers supplying imported goods to the Outer Islands from South Tarawa operate integrated businesses and manage their own shipping operations. They have the potential to play a crucial role in ensuring timely transportation of produce back to South Tarawa to stock their shops with fresh produce (Halavatau, 2017). This would require improving how produce is collected and aggregated on the islands so that larger volumes of produce can be purchased and loaded. Contracts between South Tarawa retailers and local farmers, specifying the types and volumes of produce required as well as delivery dates, would facilitate the process. Such agreements would provide a reliable market for farmers while ensuring timely transport, funded by the buyers. Service hubs like the one operated by the Abaiang Farmers Associations could also help plan transport schedules.

87. **Reform the freight subsidy for increased efficiency and accessibility.** A bridging policy before a performance-based franchise scheme is operational would be to reform the existing freight subsidy scheme. Reforms could include introducing an element of performance by linking the subsidy to actual, certified quantities of goods moved (GoK, 2021). Allowing the subsidy to be claimed and paid electronically would significantly improve uptake, as farmers could claim

from the outer islands rather than travel to Tarawa to collect the subsidy. Other areas of reform also applicable to the performance-based franchise system would include training shipping operators to reduce costs by improving maintenance, optimizing shipping routes, and investing in more fuel-efficient vessels (Newell, 2021).

e. Facilitate access to financing

88. **Food supply chain players need access to finance to intensify production and increase shipping volumes.** Investment is needed to improve production (water management systems, irrigation systems, composting equipment, livestock pens…), post-harvest management (storage, refrigeration, handling equipment), transport and processing. Public funding can enhance public goods like ports, roads and market infrastructure. Private funding is needed for private sector players, including farmers' organizations. This requires greater financial inclusion in rural areas, which will need to be based on a formal assessment of demand. A demand assessment will also help to tailor financial products and services, and build capacity in basic business skills that will be needed to access these products.

89. **Matching grants are an option to enable investment in productive assets.** Matching grants[3] can expand access to finance, stimulate the adoption of innovative technologies and facilitate the transition to market-driven agriculture. They are suitable for both individuals and groups, such as farmers' organizations or producers partnering with agribusinesses (World Bank, 2019). They can be blended with credit in the form of performance-based grants, which ensures that they enhance access to commercial finance. Under this instrument, the grant is disbursed to the borrower of a bank or microfinance loan, deposited into a dedicated restricted account, and released upon full repayment of the loan. This arrangement incentivizes timely repayment while also providing cash collateral to the lending institution.

90. **Options could also be considered to enhance access to short-term credit.** Financing is also essential for acquiring farming and trading inputs such as seedlings, organic fertilizer, feed or packing equipment. Additionally, farmers' organizations, processors and traders need liquidity to purchase farmers' produce and pay upon delivery. New financial instruments addressing difficulties in securing collateral could be explored to expand access to short-term credit. These could include loans secured against savings, receivable financing using account receivables (invoice or bill of delivery) as collateral, or equipment financing, which leverages equipment or machinery.

91. **Financial and business literacy needs to be widely provided.** Financial education is needed to enhance rural families' access to bank services, building on programs like those from DBK and ANZ. Content should include family budgeting, opening bank accounts, mobile phone banking, savings and loans, and awareness about the productive use of remittances. Basic business skills training could be integrated in financial education to support loan applications. Financial and business literacy program should target households to empower women to actively participate in economic opportunities benefitting the family. Promising models from Vanuatu (such as those initiated by the Vanuatu Chamber of Commerce and Industry and Phama Plus) and Papua New Guinea (such as collaborations between IFAD and CARE) demonstrate effective approaches that integrate financial education and business skills with agriculture production, nutrition, and family dynamics.

3 A matching grant is a one-off, non-reimbursable transfer to project beneficiaries, for a specific purpose, based on the condition that the recipient makes a contribution for the same purpose (Sberro-Kessler; Hollinger and Marx, 2012).

4.4 Stimulate demand for fresh produce from the Outer Islands

a. Improve the affordability of fresh food

92. **Improved production and more efficient supply chains will lower the cost of bringing local food to markets.** Small volumes and high prices in Tarawa markets come from expensive transportation, high risk of produce losses and insufficient collaboration within the supply chain. Improved connectivity, decreased shipping costs and better produce preservation will lower the overall costs for bringing local food to market, lowering the market price for larger quantities of produce.

93. **Expanded farmland and improved agricultural practices will increase farmer labor productivity and might reduce farmers' price expectations.** With increased productivity and larger marketable surplus resulting from improved agriculture practices and access to inputs, more commercially oriented farmers might be able to absorb a decrease in their selling price (McGregor, 1999). A Food Supply Chain Assessment will be essential to understand how prices are formed, where value is distributed along the supply chain, and how this is affected by productivity, market concentration and distance to market. This will help to understand whether higher production volumes and increased labor productivity could both lower farmgate prices and ensure fair remuneration. Furthermore, better collaboration between middlemen and farmers, with support from ALD staff to facilitate equitable negotiations based on actual farm budgets, will also be necessary.

b. Diversify markets for local foods

94. **Harness demand from public institutions that provide meals.** Public institutions offering meals to users, such as boarding schools, hospitals and prisons, can play an important role by reliably buying fresh produce from producers and traders. The Tungaru Central Hospital, a public hospital in South Tarawa, is already a buyer of Abaiang pumpkins. This regular, reliable demand may have given traders confidence to increase the volume of pumpkins purchased from farmers (Manley, 2019). Many other untapped opportunities exist. The Food Supply Chain Assessment could analyze the demand within this market segment and identify which crops are most suitable, and their volume, quality and delivery frequency. The assessment could also identify enabling policy reforms. These could include amending public procurement legislation to enable small-scale farmers to supply public institutions, and adopting standards and menus with larger shares of local nutritious products. Institutions would also benefit from capacity building and proper resourcing to allow for locally sourced, healthy meals.

95. **Food processing would open new marketing channels for farmers, reduce waste and bring nutritional benefits.** Many local food crops can be processed into flour (taro and breadfruit), chips (banana, breadfruit, pumpkin), jams and juices (pandanus, pawpaw, pumpkin, banana). Some of these products could substitute imported products and provide better nutrition. For example, the pandanus fruit, when pasteurized and processed into juice, boasts high levels of beta-carotene, which can alleviate the widespread vitamin A deficiency in the country (Rimon, 2021). Breadfruit can be processed into flour to replace wheat or baked and dried and is high in fiber, low in fat and cholesterol, rich in carotenoids, and gluten free (Francis, 2020). Additionally, processing would reduce post-harvest losses, facilitate storage and transport, extend food shelf life, and make local products more convenient to use.

96. **Locally based small-scale processing units can be an easy starting point.** In 2010, a product development facility was established to produce juice and paste from the pandanus fruit, with financing from FAO and the Pacific Community (Rimon, 2021). However, because of a series of constraints linked to the supply chain and to financing, the project was discontinued. There is potential to develop markets for processed local foods. However, the government's role

should be to facilitate access to information, expertise, and accessible financing rather than invest directly in public sector-owned processing plants. This initially limits the potential for large processing units, because of the risks associated with low production volumes, disorganized supply chains, untested demand, and challenges in accessing financing. A more feasible approach could be to promote small processing units that could be easily linked to production, cater to local demand and test South Tarawa markets. Thorough feasibility studies would be essential to confirm economic and financial viability as well as the interest of potential micro-entrepreneurs. If confirmed, a range of supports would have to be deployed to address limited technical expertise in entrepreneurship, food processing technologies and compliance with food safety standards, as well as difficulties in accessing financing. This would include information and skills development on technologies and business development, supply chain organization, and provision of start-up capital for small-scale infrastructure and equipment.

c. Raise awareness of healthy diets

97. **Expand nutrition education to promote the consumption of nutritious local foods.** The first step is to make local foods more available and affordable. This must be complimented by empowering consumers with knowledge to make healthier choices, as done by the Atoll Food Futures project implemented by Live and Learn in Kiribati. Schools can engage children, parents, school staff and the wider community to improve food consumption. The School Lunch Program is a good starting point to raise awareness. It could be expanded to include nutrition education, school gardens for practical learning, healthy boarding school meals, and a school food and nutrition policy (Burkhart, 2021). Nutritious food could further be promoted through broader social marketing campaigns, including for example farmers' markets or food fairs, cooking programs, or partnerships with supermarkets and retailers. A preliminary study would help to understand why urban residents might change their diet preferences from eating rice and instant noodles to local staple crops.

4.5 Develop alternative export industries, including seaweed, solar salt, and tourism

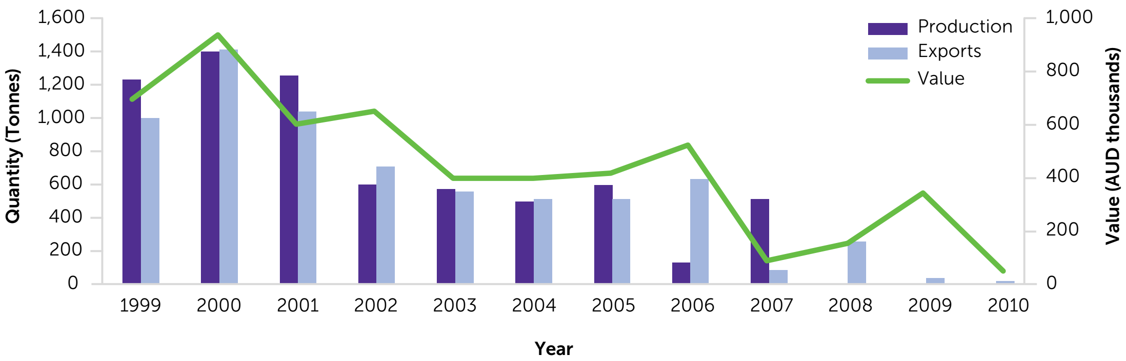
98. **The reforms discussed so far have focused on agriculture for domestic consumption, but opportunities also exist to develop other export industries.** Kiribati's exports are currently centered on frozen fish (88%) and copra (2%). Seaweed, solar salt and tourism all present export opportunities – particularly for Kiritimati Island.

99. **Kiribati previously had a successful seaweed export industry, but it declined after the copra subsidy was introduced in the mid 1990s.** Figure 18 shows production and exports from 1999-2010 of *kappaphycus alvarezii*. This was cultivated by hand in atoll lagoons on simple string lines, and dried in the sun. It was then exported as a raw source of carrageenan, a food thickening and stabilizing agent. At an approximate current market price of USD$1000/ton, returning production to 2000 levels would contribute between around 0.5% to Kiribati's GDP.

100. **Opportunities may also exist for cultivating other seaweeds for export.** Feeding small amounts of *asparagopsis taxiformis* to cattle has been shown to significantly reduce their methane emissions (Kelly, 2020). No surveys have been done to understand whether it can be economically grown in Kiribati, however it does grow naturally in Hawaii. Some estimates have suggested that it could be sold for up to A$20,000/ton (Kelly, 2020). If true, producing *asparagopsis taxiformis* at the same volumes that *kappaphycus alvareii* was produced in 2000 would contribute 6-7% to GDP.

FIGURE 18. *Kiribati seaweed exports, 1999-2010*

Seaweed was an important export for Kiribati in the late 1990s and early 2000s, though it has since declined



Source: Data from KNSO, 2013; figure reproduced from Bell et al. 2011.

101. **Kiritimati has a nascent solar salt industry.** Currently Kiritimati produces around 100 tons of salt every 7-8 months, by evaporating seawater from shallow ponds. It is sold for ~$1/kg, with around half going to fishing vessels, 30-40% exported to Japan and China, and the rest is sold domestically. This currently contributes 0.025% to GDP each year to the national economy.

102. **There is significant scope for Kiritimati to expand its solar salt production, move up the value chain, and in doing so protect the environment.** Kiritimati's salt is currently produced from a single collection of ponds measuring approximately 0.25km^2. Manulu lagoon, where it is located, measures approximately 12km^2. So, there is easily space to expand production by at least 10x. There is also scope to move up the value chain by marketing the salt as a product of Kiritimati's pure natural environment. Specialty salts can retail for over A$100/kg in Australia. So, if Kiritimati were to expand production to 1000 tons/year, and achieve a wholesale price of A$10/kg, then solar salt could contribute 2.5% to GDP per annum. The value of the salt depends on coming from a pristine environment. So, expanding solar salt would have the additional benefit of incentivizing environmental protection (as happens in Camargue, France).

100. **Kiritimati also has an existing tourism industry.** Currently Kiritimati has 165 beds catering mainly to salt-water fly-fishermen. This could be expanded to other high-value niches attracted to Kiritimati's unique bird-watching, surfing, scuba-diving, open-water fishing and star-gazing opportunities. Visitors to Kiritimati typically spend $320/night on accommodation (TAK, 2020). At 60% capacity this would contribute around 3% per annum to national GDP, from accommodation fees alone.

103. **There is significant scope to expand Kiritimati's tourism sector, but it requires many upgrades to infrastructure and agriculture.** There would be scope to at least double the number of beds on Kiritimati, contributing another 3% per annum to GDP. However, doing so while maintaining a high-value niche requires upgrades to internet, water, sanitation, electricity and road infrastructure (TAK, 2020). It will also require more farming on Kiritimati. In the 2019 International Visitor Survey, tourists regularly mentioned the lack of fresh fruit and vegetables. While there is sufficient land on Kiritimati to do this, farmers currently do not have the incentive to grow anything but copra.

104. **Kiribati can only realize these opportunities if the copra subsidy is lowered.** Each of these industries is labor intensive. Seaweed farming can be done at smallholder scale, and requires lines to be tended and seaweed to be dried. The most valuable solar salt (*fleur de sel*) must be collected by hand. Tourism requires a large direct workforce, as well as an indirect workforce to farm food for guests. Currently households have a heavy incentive to focus on copra production. The copra subsidy must be reduced in order to encourage workers to move into these other potential export industries.

5. The policies

Implementing policy directions

5.1 Strengthen sector knowledge to guide policy making and to monitor policy performance

105. **The agriculture sector severely lacks data.** No agricultural census has been conducted in Kiribati and the main official source of agriculture data is from the 2020 Population and Census and the 2019/2020 Household Income and Expenditure Survey. While they provide valuable insights into rural households and economic activities, significant data gaps exist in critical areas such as production and yields, farm structures and land use, prices and agricultural trade. Furthermore, the use of different, uncoordinated methodologies hampers data comparability. Other important information gaps are related to value chain and market analyses, stakeholder analysis and farm profiles and budgets.

106. **Data and analysis are essential to support the development of agriculture policies.** Regular collection, analysis and dissemination of statistically sound agriculture data and information are fundamental for gaining a better understanding of opportunities and challenges in the sector. They are also needed to develop evidence-based, realistic agricultural policies, monitoring achievements and evaluating policy impacts. Furthermore, sector information is key to support the dialogue on policy options between the government, sector stakeholders and development partners and to coordinate development.

107. **Priority studies are essential to guide diversification efforts, followed by a robust programme for strengthening data collection and analysis.** A set of priority studies are proposed in this report to improve the current knowledge basis: a food supply chain assessment to orient the development of market linkages for Outer Islands crops; an assessment of the demand for financial services along the food supply chain; and a nursery assessment to determine the conditions for developing viable, privately-owned nurseries across the islands. Additionally, a comprehensive agriculture data collection programme could be developed within MELAD, so that reliable and up-to-date information is available to guide policy development and monitor sector performance. This would include: establishing a system for the regular and systematic gathering of agricultural information across all islands; setting up a centralized database or platform to store and manage collected data securely for easy access and analysis; and building the capacities of MELAD staff in Tarawa and in the Outer Islands to ensure the collection, verification and analysis of data, as well as in reporting and using data for evidence-based decision-making. Integrating modern technologies, such as geographic information systems, and equipping agriculture staff with tablets, would enhance data accuracy and timeliness. Finally, conducting an agricultural survey would lay the ground for establishing a systematic framework for ongoing data collection.

5.2 A roadmap for agriculture diversification and commercialization

108. **Translate strategic objectives into prioritized operational activities.** The strategic framework proposed to achieve diversification and develop food supply chains covers a large range of initiatives. From the start action will be required across different areas of intervention: there is no point developing food production if it cannot reach the market. However, initiatives cannot be all implemented simultaneously or immediately. A roadmap is required to translate broad objectives into operational activities and outcomes and to determine an adequate order of priorities, based on available financial resources, stakeholder priorities, and the necessary sequencing of reforms and activities. This would include conducting assessments of technical, financial, political and administrative feasibility to develop the proposed activities, and identifying their cost, expected impact, and required preconditions or enabling measures. Clarifying stakeholders' role and implementation responsibilities will also be essential, including because many proposed areas of intervention fall under the responsibility of other government agencies (e.g. Ministry of Finance and Economic Development; Ministry of Information, Communication and Transport) or would need partnering with other agencies (e.g. Ministry of Health and Medical Services, Ministry of Education, Ministry of Women, Youth, Sports, and Social Affairs).

109. **Engage stakeholders in a broad dialogue for preparing and implementing the roadmap.** The 2021 National Food Summit engaged public and private food stakeholders to develop national pathways for transforming Kiribati food systems. Building on this success by involving government agencies, island councils, the private sector, development partners, and NGOs in developing and implementing a food roadmap is essential to gain broad consensus. Organizing the Food Consultation to share the outcomes of the Food Supply Chain Assessment will be a first step in mobilizing stakeholders' participation, developing collaboration and agreeing on priority areas of interventions. Subsequent consultations of a similar nature would maintain stakeholder buy-in, foster transparency, and facilitate ongoing dialogue regarding the implementation progress and achievements of the roadmap.

110. **ALD would have an important role in leading and facilitating the roadmap, without crowding out the private sector.** Some initiatives, such as extension and biosecurity, can be directly implemented by ALD, in line with its mandate. However, ALD's primary role is to develop an enabling environment. This involves promoting the private sector, facilitating market opportunities and market linkages, promoting partnerships with government agencies and development partners, fostering coordination, and monitoring progress against development goals. ALD's organization is currently centered on production. It may need to be expanded to include a small unit for improving food supply chains, as envisaged by the Kiribati Agriculture Strategy (MELAD, 2020). A Food Systems Task Force that includes private and public stakeholders could also be established to provide guidance, promote strategic partnerships, and facilitate coordination. This would mean reversing the current trend for ALD to enter into productive activities, to instead support production by private sector by farmers and micro-enterprises, including local shops.

111. **Develop a financing strategy.** A financing strategy is needed for the food sub-sector, which could be collaboratively developed by ALD/MELAD in partnership with the Ministry of Finance and Economic Development, private stakeholders and development partners, to optimize resource allocation. Reducing the copra subsidy should generate substantial savings. Some of these will need to be allocated to social protection schemes targeting the poor. This will still leave substantial savings that could be used to invest in public infrastructure, strengthen the copra value chain, and diversify agriculture. However, this is only likely to cover a small proportion of the total funds needed to diversify Kiribati's agricultural sector, making development partners' funding crucial. Furthermore, developing an enabling environment, coupled with incentives to facilitate access to commercial financing, holds potential to unlock private investment and could be strongly promoted.

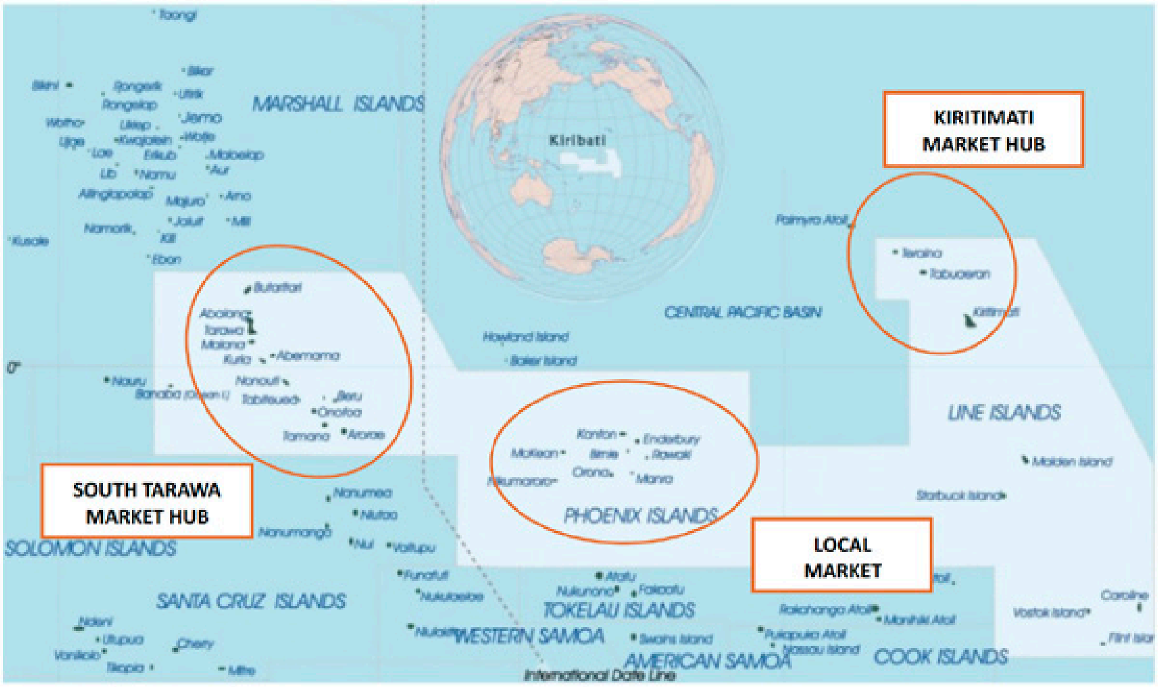
112. **Four top priorities were identified to enable the proposed reforms and kick-start measures that can bring quick impact.** The first priority would be to reduce the copra subsidy. This would create opportunities for farmers to transition from coconut monoculture to more diversified farming. It would also free up resources to increase investment in other sectors, including agriculture. Second, a Food Supply Chain Assessment would provide critical intelligence to guide the preparation of the roadmap for agriculture diversification and commercialization. Third, training ALD staff to advise farming households on innovative production technologies, post-harvest management and farming as a business would be a low-cost way to increase output. This would best be done in partnership with farmers' organizations, commercial entities, NGOs and development projects. Finally, training middlemen would improve supply chains and reduce post-harvest losses.

5.3 Adapt interventions to each island

113. **The proposed menu of policy options will need to be adapted to each island, based on specific opportunities and constraints for market-oriented food production.** This study outlines a broad menu of strategic options to expand food production and marketing. Certain initiatives, including enhanced extension and advisory services, improved access to planting materials, and basic post-harvest management, should be universally accessible. These services should be provided irrespective of whether households produce for home consumption or for the market, thus ensuring coverage across all islands where ALD maintains an Agriculture Assistant and a Nursery Manager. Further interventions will be required only in islands that have potential to market produce either locally or on an urban market. This will involve improving post-harvest management, establishing market linkages, and facilitating access to financing. The demand for such support will be particularly pronounced on islands transporting produce to urban markets, alongside the necessity for improved shipping services. In addition to proximity to markets, vulnerability to drought and water availability will call for specific support.

114. **Proximity to markets is the main factor that determines islands' potential to participate in food supply chains.** Island distance from major population centers increases transport costs, affects the shelf life of fresh produce, and complexifies logistics. Two market hubs, centered around the two urban islands, attract or have potential to attract food production from the surrounding Outer Islands (Figure 19).

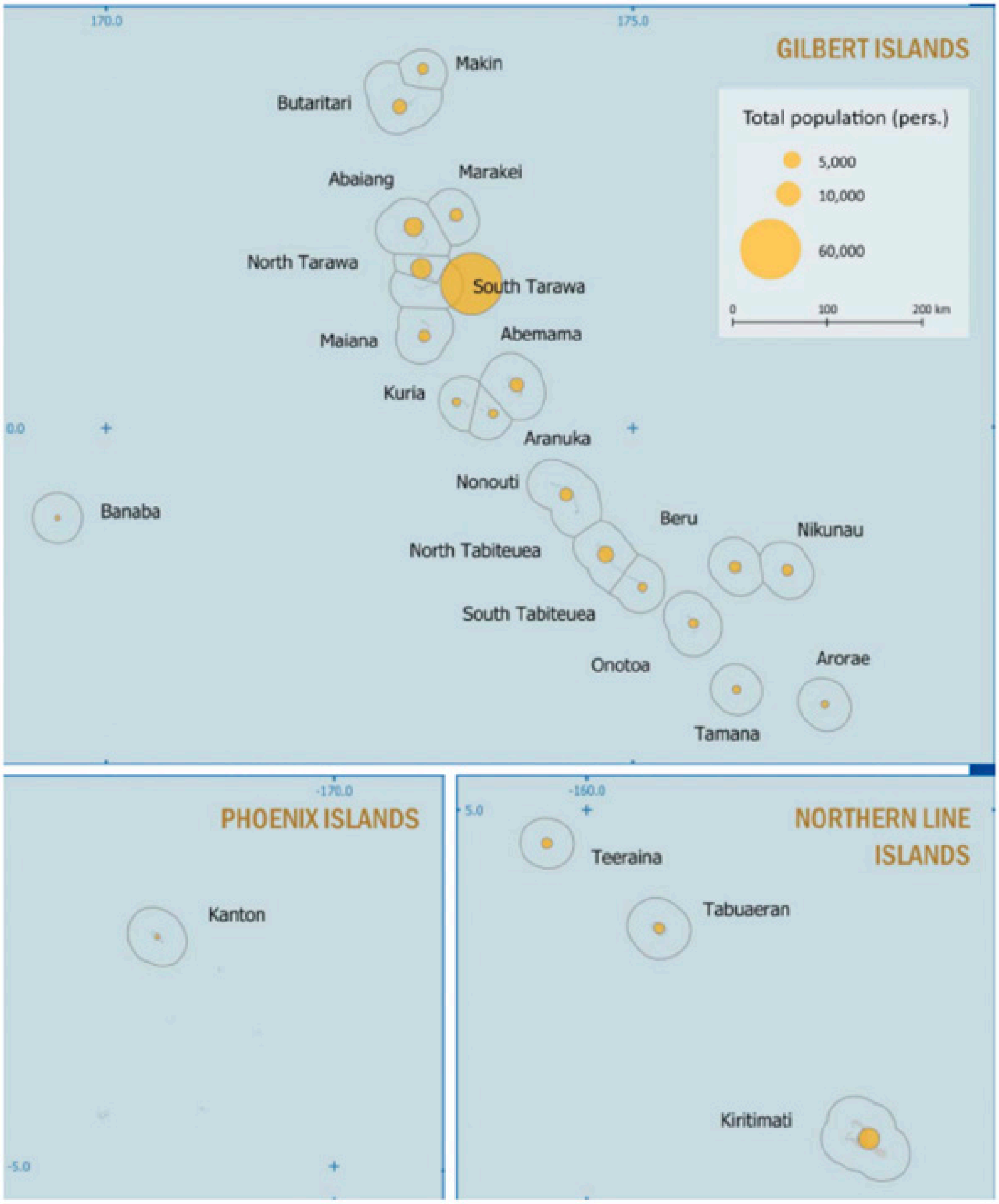
FIGURE 19. *Market hubs in Kiribati*



115. **Distance to the market will also determine target crops.** In the absence of cold storage, the shelf life of leafy food plants and exotic vegetables such as tomato or cucumber, is limited to one day. Their production should be reserved for home consumption and local island markets (including Kiritimati), except in islands close to South Tarawa where they could also be shipped daily to the capital. Crops with a longer shelf life such as starchy root crops, pumpkins, cabbages, breadfruit, pandanus and banana are better suited for transport over longer distances.

116. **Population size will determine islands' capacity to supply markets beyond local ones.** In tiny islands (Figure 20), the population may be too small to produce for home consumption and the local market, as well as to grow sufficient surplus for shipping out.

FIGURE 20. *Population size by island*



Source: GoK, 2022.

117. **Agro-ecological conditions will also determine the production potential and type of support required.** Exposure to drought and the availability of water resources will affect the potential for production and the type of support needed to mitigate adverse conditions. Such challenges need to be addressed whether households produce for their family or for any market.

118. **Islands servicing the South Tarawa market hub would need to tailor their production to their environment and distance-to-market.** The capital city South Tarawa hosts 53 percent of the population and is part of and connected to the Gilbert Islands, which altogether host 90.5 percent of the country's population. Islands closer to South Tarawa, such as North Tarawa and Abaiang, could produce perishable crops, provided they can offer prices that are competitive with those of South Tarawa and Betio producers. Farmers would need access to specific seeds and inputs for cultivating exotic crops. They could target a large range of markets, including supermarkets, hotels and restaurants. More distant islands would have to focus on crops with a longer shelf life, would need ventilated storage to store crops until they can be shipped, and would benefit from a performance-based shipment system. They might also be good candidates for processing local fruits, such as pandanus or papaya, into juices and jams (and for processing coconut sap), possibly for urban markets as well. Southern islands are more affected by water scarcity and prone to droughts, and would need investments in water catchment and conservation, irrigation, possibly including sun-powered desalination equipment for both human and agriculture use. Cold storage, more frequent and adapted transportation would expand the range of products that could be shipped to South Tarawa. Tiny islands far from South Tarawa could also be supported to expand food production, mainly for home consumption and local markets.

119. **Agriculture around Kiritimati could be tailored to compliment a burgeoning tourism sector.** Kiritimati is 3,000 km away from South Tarawa, is the largest island, and, with around 7,500 inhabitants, is the most populated island after South Tarawa. It has significant tourism potential. Kiritimati has currently very limited smallholding vegetable and fruit tree production (estimated to 0.2 km^2) (Mills et al., 2019) but hosts a few innovative agriculture endeavors, including a commercial farm, household-based fresh produce production supported by DFAT/Atolls Future and experiments with hydroponics. Kiritimati producers interested in producing for the local market would need the full range of proposed initiatives, except shipment. Improving access to water is a priority because although the island enjoys a series of freshwater lenses, these are vulnerable to salt intrusion, overuse and infrequent replenishment from erratic rainfall (Mills et al., 2019). The Kiritimati hub also includes the other two inhabited islands of the Line group, Teraina and Tabuaeran, which ship root crops, pumpkin, papaya and breadfruit to Kiritimati and would have similar needs for support as more distant islands in the South Tarawa hub.

120. **The Phoenix Islands will need to focus on meeting local demand due to their isolation.** There is only one inhabited island in the Phoenix group, Kanton, with a population of 41 people (GoK, 2020) that produces for home consumption with little prospect for converting from coconut production into market-driven food production.

Annex 1: Summary list of recommendations by responsible authorities

Recommendations by responsible authority	Importance	Timing	Intervention type	Section reference	To be preceded by
Ministry of Finance and Economic Development (MFED)					
1 Reduce the minimum support price for copra and redirect savings to other sectors, including social transfers and agriculture diversification	High	Short Term	Regulatory reform	4.1	Rec. 7, 9, 11
2 Reform the freight subsidy for increased efficiency and accessibility	High	Medium Term	Regulatory reform	4.3 d	
3 Expand access to financing for private sector investment, based on prior demand assessment, through financial education, blended financing associating public and private funds, and technical assistance to financing institutions	High	Medium Term	Regulatory reform	4.3 e	
Ministry of Environment, Lands and Agriculture Development (MELAD)					
4 Promote private sector involvement in island-based nurseries and input retailing, by reducing ALD involvement, and streamlining biosecurity processes	High	Medium Term	Regulatory reform	4.2 b	

5 Improve the process and regulations for long-term leasing of customary/ government land to encourage investment in physical assets	Medium	Medium Term	Regulatory reform	4.2 c	
6 Create a zoning plan for Kiritimati to differentiate between residential, commercial, industrial, recreational, ecological and agricultural uses of various areas on Kiritimati[4]	Medium	Medium Term	Programmatic investment	4.2 c	
7 Build the capacities of ALD staff to advise farming households on innovative production technologies, post-harvest management and farming as a business, and to empower women to take advantage of new economic opportunities, along Do No Harm and household-based approaches [5], in partnership with farmers' organizations, commercial entities, NGOs and development projects	High	Short Term	Programmatic investment	4.2 d	
8 Develop a market information system	Medium	Medium Term	Programmatic investment	4.3. a	

4 In collaboration with the Ministry of Line and Phoenix Islands Development (MLPID).

5 In collaboration with the Ministry of Women, Sports and Social Welfare (MWSSW).

9 Build middlemen capacities for enhanced supply chain management and promote alternative market channels to middlemen, including farmers' organizations, contract farming, productive partnerships and privately owned service hubs	High	Short Term	Programmatic investment	4.3 b, c	
10 Review the legislative and regulatory framework for enacting the 2006 Food Safety Act and adopting the Codex Alimentarius food standards and codes of practice[6]	Medium	Medium Term	Regulatory reform	4.3 c	
11 Establish a roadmap for agriculture diversification and commercialization along with a financing strategy, building on strengthened sector knowledge (including a Food Supply Chain Assessment) and on stakeholders' dialogue	High	Short Term	Regulatory reform	5.2, 3	
Ministry of Infrastructure and Sustainable Energy (MISE)					
12 Invest in improved port infrastructure and access to islands	High	Medium Term	Programmatic investment	4.3 d	

6 In collaboration with the Ministry of Health and Medical Services (MHMS).

Ministry of Information, Communications and Transport (MICT)					
13 Improve service frequency and reliability by tendering fixed-term performance-based contracts to private shipping providers on unprofitable routes	High	Medium Term	Regulatory reform	4.3 d	
Ministry of Commerce, Industry and Cooperatives (MCIC)					
14 Invest in suitable storage at docking facilities and wet markets, particularly in South Tarawa and Kiritimati, with private sector management	Medium	Medium Term	Programmatic investment	4.3 c	
15 Promote island-based small-scale processing units	Medium	Medium Term	Programmatic investment	4.4 b	
Ministry of Education (ME)					
16 Expand nutrition education to promote the consumption of nutritious local foods	Medium	Medium Term	Programmatic investment		
Ministry of Education (ME) / Ministry of Health and Medical Service (MHMS) / Kiribati Police Service (KPS)					
17 Promote sourcing from local farmers for public institutions offering meals to users (schools, hospitals and prisons), through capacity building, adaptation of the public procurement legislation, adoption of standards and menus and allocation of commensurate budget resources[7]	High	Medium Term	Regulatory reform/ Programmatic investment	4.4 b	

7 In collaboration with the Ministry of Environment, Lands and Agriculture Development (MELAD).

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