

# Background and Development of Food Crisis in Sri Lanka



Report by:



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## **1. Background to crisis;**

### **End of war and dawn to a new era.**

Year 2009 marked an important year in history of Sri Lanka. The 30-year-old civil war in the north east parts of the country ended in 2009 and brought new hope for Sri Lankans in economic prosperity. Up to 2009, country was partially engulfed in poverty. Military spending for war was justified as a reason for high government expenditure which was accepted by general public. War ended in 2009 with a heavy loss of human lives to the northern Tamil community and incurring heavy loss to agriculture lands, livestock and property. After the war, scenario in south was much different. Most Sinhalese majority people started to compare President Mahinda to ancient kings who united the country and people started to idolize him. Every street and corners of the country was carrying banners and posters with photos of the president. This idolizing has given the president an absolute power over every matter in the country. Sri Lankans were hopefully expecting to win the next war against poverty through economic development.

Immediate post war scenario in the country has shown some promising trends for economic growth. After 30-year war, the country was peaceful and tourism industry flourished. Many pristine locations in the north and east were open to tourists and many Sri Lankan companies and expats (specially the Tamil diaspora settled in western countries) started to invest heavily back in northern regions. This foreign investment contributed to development of the region and tourism sector as well. International development agencies were also in the process of rebuilding the war effected communities, thus the northern region witnessed rapid development. Sri Lanka received a considerable influx of foreign exchange from the donor agencies as well.

Products from fertile lands in the war-torn regions which were highly suitable for paddy and other upland crops were also opened for rest of the country. Following the war, these regions received fertilizer and other inputs as well as a good price from the southern regions. In return, southern regions received paddy, chilly, vegetables, pulses and other upland crops from this region easing the pressure on goods import and paving the way to self-sufficiency of rice and some other crops. This economic development has created a massive economic boom all over the country.

### **Rapid infrastructure development and economic miracle?**

Southern regions also witnessed economic developments parallel to this. Tourism sector, apparel sectors, IT and business services sectors all over the country witnessed rapid growth. Infrastructure development through highways, building new ports, expansion existing ports, building new air ports and new economic zones started to pop up. As these development projects were being carried on, political hierarchy busied them self in corruption through high spending infrastructure projects. The war victory and the economic boom shadowed corruption and many underlying problems for many years.

With time, many of these white elephant projects were implemented with the intention of high spending led corruption and as a show piece for economic development where voter base of southern political elite can be pleased. Especially many huge projects were implemented in one of the least populated and water scare Hambanthota region, where the political elite hails from. As these projects were assessed to be financially not viable, regular lending agencies such as world bank, ADB and other agencies declined to fund. Instead of these agencies, the government obtained necessary funding from Chines lending agencies at higher commercial rates, without grace period and lower payback periods. This situation made a big

pressure on finding forex for payback of heavy instalments in following years. To earn forex, it needed higher export earnings, for which government has not pay attention to develop. Government was in the view that infrastructure development will attract tourism and FDI (Foreign Direct Investment) and everything will move-on, by an invisible hand. As a temporary measure, government kept on obtaining more foreign loans at commercial rate and issuing ISB (International Sovereign Bonds) to bridge the trade deficit and to repay loans.

Few years following the war, political party that was leading the government wanted to maintain its popularity thus keen on showing the public some development miracles. Therefore, main focus of the government was made on large scale infrastructure projects, such as highways, ports, parks, conference halls, telecommunication towers etc., rather than developing the support services needed for agriculture and other industries. The actual need of infrastructure and support service development for economic growth was not fulfilled by with the short-term development activities that was implemented. Tougher external conditions for growing loan instalments made the situation worst.

### **Beginning of economic downturn**

While the country enjoyed an annual growth rate of 6.4% during 2015, which was well above the South Asian peers, Sri Lankas income was at 10.75 Bn USD while the Expenditure stood at 16.95 Bn USD. The economic growth the country enjoyed has increased the demand for luxury goods, vehicles, fuel, electric appliances, imported food and medicines. Over the period, importation bill started to increase, increasing the trade deficit gap. However, the GDP which was measured at 80.5 Bn USD in 2015 started to stagnate at the same amount over the next few years.

This situation has laid the foundation for foreign exchange crisis by year 2015. By that year, many experts were warning of the crisis ahead and recommended to take precautionary measures. New government which came in to power after defeating the former president Mahinda Rajapaksa in 2015 was ardent in making Sri Lanka a knowledge-based market economy. The government which was politically dubbed as the “Good governance” government kept forward policy reforms oriented towards more accountability and fight against corruption. But internal drifts within the coalition parties of the government did not make a fruitful outcome of policy reforms and the same drift has led to the famous “constitutional crisis” in 2018. In the year 2016, the government has applied for IMF facility for USD 1.5 Bn, but realized only 1.3 Bn USD due to failure of compliance to conditions attached. In a nutshell, the good governance government was also failed in making policy changes towards averting a financial crisis. The loss of credibility from the IMF is felt as recent as 2022 May, where for bailout negotiations, IMF was insisting on concrete proofs of policy changes made.

These precautionary measures included some drastic changes to the existing economic policies of the government. Afraid to lose the popularity and the hard-earned voter base of the political party, the governments led by both political coalitions did not implement these measures and continued on same policies of subsidizing at public expense. Many of the state enterprises were making heavy losses due to these subsidizing policies. The most loss-making government enterprises during 2019 were CPC (Ceylon Petroleum Corporation), Sri Lanka Airlines, and CEB (Ceylon Electricity Board).

Year 2020 burst off the financial crisis mainly led by the consequences of global pandemic of Covid-19. Travel restrictions imposed between countries have affected the tourism sector which earned USD 4.4 bn in 2018. This was a huge blow to the already ailing economy. It was made worst by the extended lockdown

conditions in the island which hampered the industrial sector, apparel, agriculture export sector. Shipping and freight forward sector globally slowed down, leading to reduction of some export income. These situations led to diminishing foreign exchange receipt from 2020 onwards.

Things made worst during 2022, where rupee devaluation started. Artificially pegged at Rs. 200 per USD, Rupee devaluation has sent the USD to Rs. 380.00 range once central bank interventions on rupee was removed. This situation had directly affected the main foreign exchange earner, foreign remittance by people employed abroad. This foreign remittance which was 7.1 bn USD in 2020 showed a significant drop over the period. By 2022, the remittance drop was so drastic that 2021 January remittance of 675.3 mn USD was dropped to 259.2 mn USD in 2022 January. Due to the devaluation, a black-market rate appeared on informal sources of foreign exchange remittance such as Undial/ Hawala. These markets paid a premium price of Rs. 40.00 extra for a USD and remittance was mainly done through these informal sources rather than official banks. This situation has aggravated the foreign exchange shortage to state thus making it one of the leading causes for the forex crisis after 2022 March.

In 2021, as a solution to handle the issues of fertilizer import bill and fertilizer subsidy, government made a greave mistake of converting entire nation in to an organic farming nation within a short period. Its cascading effects were strongly felt in 2022, paving the way to food crisis. These effects will be discussed in greater length in the following chapters.

## **2. Organic agriculture sector before agro chemical importation ban**

### **Prominence to healthy food**

At the meantime, organic agriculture sector has achieved a slow and steady progress over the period. Sri Lanka had a sustainable farming background distinctively evolved for each climatic background separately. Globally renown sustainable farming model “Kandyan Forest Garden” was one famous example of adapting the farming method to suite the climate and ecological conditions of the surrounding. Apart from that, from ancient time, agriculture system has evolved unique farming methods to suite the locations and to do sustainable farming with minimal external inputs. In the dry zone cascade tank irrigation system after each paddy land, the excess water runoff is collected and sent through a forest patch and buffalo wallow where it replenished with nutrients and used in the next paddy field. Land use is well divided in to low land and high land agriculture based on to topography and soil erosion control considerations.

After the green revolution which has rapidly changed the farming practices in Sri Lanka over the 1960's, organic farming as a healthy farming concept slowly started to take shape around 1980's. Due to various factors, reasonable number of farmers have embraced organic farming as their way of farming, but it did not grow as a sector due to limitations of specialized market for organic products. Towards late 1990's country has started to experience increase in kidney failures among farming communities in the dry zones. As the origin of its cause was not identified, it was named as CKDU (Chronic Kidney Disease of Unknown etiology) and chemical intensive farming was pointed out as the major culprit. Some research conducted by local scientists in late 2000's has also pointed out accumulation of Cadmium and Arsenic found as trace elements in chemical fertilizer as the major cause, although this claim is still debated. This situation has caused a major uproar in the country on the on chemical intensive farming and bringing healthy foods to the forefront. Many consumers started to be concerned on the food they consume, as a result the slogans “Toxic free”, “Healthy food” and “Natural food” started to be used quit often. Many outlets on these foods

started to appear and many consumer initiatives came forward to establish a proper market and a supply chain for these health and traditional products.

### **Organic farming as a political tool?**

With these sudden growths, came many opportunities for the organic sector as well as some threats. Unregulated claims of “Toxic free” by market-oriented businesses had the threat of tarnishing the image in long run and damaging the growth of organic sector. This concept of going organic and going local / traditional has attracted the attention of anti-imperialistic and pro nationalistic political groups. One prominent Buddhist monk with political ambitions and nationalistic views have started to use the organic agriculture concept for advancement of his political propaganda through his party ‘Hela Urumaya’. His campaign has been supported by professionals with similar nationalistic views, and medical professionals took the lead as the healthy food is directly related with the kidney disease they were concerned of. This unity is one of the major factors that dragged medical professionals in to the political arena and elevated them to the status of being policy advisors to the president on agriculture. Governments sudden decision to go organic was mainly pushed by these advisory groups which is to be discussed in details later on this report.

The expansion of organic agriculture sector has highlighted some needs to be addressed for further growth. One important aspect was regulation of organic sector and standards for organic farming. This was achieved through establishment of National Organic Control Unit (NOCU) under the Export Development Board in 2014. Main goal of creation of this unit was to regulate organic farming, processing and certification to ensure credibility of Sri Lankan organic products among local and export markets. In line with this, Sri Lanka has also established organic agriculture standards ‘SLS 1324: 2018: Standard of Requirements for Sri Lanka Organic Agriculture Production and Processing’ in 2018. During same period in the Moragahakanda area, government has relocated 2600 farmers to newly established land due to construction of a reservoir. This new area of 5600 hectares including a tourism zone and 1441 hectare of cultivation land was entirely dedicated for organic farming making it an exclusive organic zone by an extraordinary gazette notification in 2020. This area was promoted for organic cultivation with an idea of export oriented organic crop production. As per a survey conducted by verité research in 2021, 10% of the farming community have not used any chemical for farming out of health concerns even before banning of chemical fertilizers. By 2018, organic agriculture exports from Sri Lanka was 44,300 MT while Sri Lanka managing to become 2<sup>nd</sup> largest organic tea producer and exporter. Country has been witnessing a steady growth of organic export sector where many exporters were finding it difficult to cater their export orders due to high export order volumes.

Things have changed much after the decision to go whole country as organic. Many individual Factors behind forex crisis and going organic which led to food crisis and their contribution to current scenario is discussed in details in following chapters.

### **Government decision to ban chemicals and converting the country in to organic farming**

By 2020, government was facing severe foreign exchange shortage for importation of essential goods. By this time fertilizer importation stood at 400 mn USD and the fertilizer subsidy government was bearing accounted for 0.24% of the GDP. Due to the forex crisis, making a strong decision on fertilizer import subsidy was seen as inevitable. Most of the intellectuals expected that, government will lift the subsidy and allow the market mechanism to decide the price and amount of fertilizer to be imported. But,

president Gotabaya Rajapaksa totally ignoring the recommendation of subject experts, took a decision to convert the country in to an organic farming nation, thus eliminating the requirement of chemical fertilizer and other agro chemicals importation. How president of a country ignored the recommendations of subject matter specialists and pushed forward ideas of some close allies was an important lesson to be discussed.

This situation was in the making before president Gotabaya Rajapaksa came in to power. In order to bring him to presidential seat, one of the main tactics used by his political party is to form a group of intellectuals called themselves as “Wiyath maga” (Way of the intellectuals). As president Gotabaya was a dual citizen holding a US citizenship, this group promoted a knowledge-based development for the country using his US experience.

To assist that, they promised the country would be guided by the intellectuals rather than the regular politicians. Most of these members of the “Wiyath Maga” group were politically motivated. The campaign got so intense, patriotic and rhetoric, that many true intellectuals, academics and elite members of the society found it difficult to raise their voice against many of the government’s decisions. These academics and field experts’ views have been counter attacked and silenced by these politically motivated ‘Wiyath maga’ group. Many politically biased media were on the side of ‘Wiyath maga’ and their campaign and views became prominent idea of the country. Many of their false ideas were generalized to be normal based on being traditional, cultural and patriotic. In a similar manner, traditional farming and traditional foods were elevated to such a great height that, a false picture was implanted on possibility of attaining self-sufficiency of food through traditional farming and chemical free farming.

One of president Gotabaya Rajapaksa’s main advisor from “Wiyath Maga” also the president of GMOA (Government Medical Officers Association), was one of the key people who influenced president on making the decision to turn in to organic farming overnight. Out of his scoop of being a medical officer, he has outspoken on traditional farming and a prominent member of advisory panels to president Gotabaya. Out of desperation to find an alternative to fertilizer import bill, these advisors proposed the government to turn the country in to a complete chemical free farming nation. The amount spent on fertilizer subsidy was proposed to be spent on providing organic fertilizer to farmers in Sri Lankan rupees thus saving foreign exchange. On 2021 May 6<sup>th</sup> through a gazette notification, the government prohibited importation of chemical fertilizer and other agro chemicals paving the way to establish an organic farming nation.

### **3. Where we failed?**

#### **Lack of groundwork for going organic**

Decision to go organic was made within a very short time frame. At the mean-time, people involved in implementing this policy decision did not had enough understanding of the dynamics of agriculture sector and farmers adaptation to new technology. Their basic understanding was, ‘if the chemical fertilizer was not available, farmers will turn to alternatives’. But, the government failed to implement the following groundwork before going organic.

- i. Lack of understanding of organic farming concepts – Organic farming follows a complete makeover of the land gradually over a period around 3 years. During this period, soil conditions are built to facilitate plant nutrition. Many integrated practices were followed to maintain soil

- fertility and pest control. Without understanding these concepts and preparing the ground to accommodate them, going organic overnight is meant to be a failure.
- ii. Lack of farmer awareness on going organic – Government failed to provide necessary awareness on organic farming and how it is to be done. Either through the agriculture extension service, agriculture media outreaches or the mass media, government institutes failed to provide enough awareness regarding this change. In fact, neither of these government institutions were prepared or had necessary information to provide awareness to the public on the first place. This lack of awareness was in 2 categories. First, the awareness and knowledge were lacking among government agriculture and other higher officers. The second category was lack of awareness on farmer level. Responding to a survey in early 2021, only 20% of farmers have informed they have received knowledge on transitioning to organic farming.
    - a. Awareness and knowledge on organic principles and methodologies were minimal among the extension service officers, who throughout their career have been trained on chemical intensive farming. These officers have not been given awareness or proper training on organic farming methodologies. Only training they have received is on composting and liquid fertilizer preparation. Without proper understanding on the principles, the way they demonstrated these methodologies have led the farmers to panic on finding raw materials for composting.
    - b. Farmers lack of awareness was one of the major reasons which led the way for the food crisis. Without proper awareness, even small-scale farmers who were able to implement organic farming was reluctant to try at the beginning.
  - iii. Overnight implementation without any strategic plan – Going organic was implemented countrywide without a strategic plan. None of the government agencies had any clear idea or a vision on what is the role expected by them.
  - iv. Lack of structured consultation with industry experts and not following the important recommendations received - As the gazette notification banning the importation of agro chemicals came as a sudden decision, many of the agriculture experts, academics and intellectuals have raised their voice to reconsider the decisions including drafted an emergency strategic plan as a volunteer measure. But the considerations of these drafted strategic plans by government and their outcomes were almost nil.
  - v. No research and lack of technical knowledge on organic fertilizer production and storage – Over the past decade, while there was a trend of organic farming across the globe and the chemical fertilizer prices are predicted to go up, the Government authorities responsible for agriculture sector have minimal strategic plan for alternative arrangements. Research on organic fertilizer production, storage and transportation was mainly limited to compost production. Considering a national wide fertilizer requirement, organic liquid fertilizer came as a handy option as it is concentrated and easy to transport in small quantities contrast to bulk composts. But there was no research done on liquid fertilizer production on industrial scale, storage, transportation requirements and shelf life. This major fault proved to be catastrophic during the transportation and storage before distribution to farmers as liquid fertilizer containers (cans) started to explode due to fermentation. It created huge mess with smelly liquids splashed over all the vehicles and agriculture offices where it was temporarily stored. This made a huge displeasure on farmers towards organic liquid fertilizers, and discouraged farmers from adapting to.

- vi. No proper organic fertilizer production facilities to cater the demand – Government did not have a plan to cater the demand of organic fertilizers to the point that, they did not have an estimated requirement on district wise on the first place. Rather than, some rough estimations made by officers responsible for sectors, which were based on the average area of cultivation, these requirements were not gathered at a central coordination point and properly assessed. These were basic details needed for planning organic fertilizer production facilities on district wise. This failure left the farmers as well as potential entrepreneurs bewildered on how to produce and which group to target. Many entrepreneurs missed to initiate compost and liquid fertilizer production to cater to the first cultivating season. This situation created a lower supply of products than the anticipated amount. Geographic mismatch between the bulk producers and farmers ended up involved in heavy amounts being transported across large distance increasing the transportation cost and cost of compost.
- vii. Farmers confusion leading to miss the season – Many farmers who were involved in agriculture as a part time occupation awaiting the situation to settle as the organic farming was something new for them. They waited until fertilizer issues were sorted out as there was a general idea that, government will cancel the gazette notification allowing chemical fertilizer importation due to chaotic scenario created post-gazette notification period. They were also awaiting until proper organic fertilizers were available to initiate farming. But this wait was in vain, as no fruitful outcome came in to affect. Ultimately many of these small-scale farmers either gave up farming in the season or started to farm on the tail end of the season where they felt a price increase due to shortages.

### **Heavy fertilizer subsidy – Prevented farmers from general adaptation to current crisis**

Supply of chemical fertilizer at a subsidized rate has been a popular election slogan among all the political parties. To win the votes of farming community, this slogan was heavily promoted regardless of the party policy. That situation was so strongly embedded in the farmers mindsets, that when the global fertilizer prices increased and any ruling government's decision to reduce the fertilizer subsidy backfired defeating the party in the upcoming elections. Due to this reason, all governments continued to provide chemical fertilizer at a highly subsidized price. This situation have made positive impacts on crop yield and increased extent of cultivation, leading to self-sufficiency in paddy and some other crops. But the huge subsidy bill which was Rs. 36 Bn in 2020 and accounted for 0.24 % of the GDP became unbearable owing to looming financial crisis. A gradual phaseout of the subsidy was needed to manage the financial crisis.

The other major drawback of the subsidy program was that, it's being a blanket program covering the entire farming sector, it promoted some extent of excessive usage and wastage. Continuation of the subsidy program also prevented adaptation of the farming community to alternative soil nutrition management programs such as using organic fertilizer and nutrition management practices. This was practically demonstrated following the governments sudden conversion to Organic farming policy. The results of paddy yield with organic conversions was contrast in 2 agro climatic regions.

There was a paddy yield drop in Dry zone paddy cultivating areas with reduction of chemical fertilizer. Those paddy varieties and the soil types were highly responsive for chemical fertilizer and provided higher yields with them. So, the organic farming programs failed in the dry zone, which accounted for the highest extent of cultivation as well as highest per capita yield. Farmers



were using chemical fertilizers they could obtained through all means with combination of organic fertilizers. Still, the average yield for 2021 Maha season was 5441 MT / hectare which is lower than the average yield for 2019 Maha season at 5511 MT/hectare for Polonnaruwa district in dry zone. But in the case of wet zone, due to soil type and climatic reasons, paddy was not much responsive for chemical fertilizer and in-fact provided stagnated yields. But application of organic soil nutrient management practices along with organic fertilizers have showed increase of yield contrast to chemical fertilizer usage. This can be attributed to organic fertilizers ability to handle iron toxicity which was prominent in wet zone soils. In Kegalle district wet zone, average yield for 2021 Maha season is 2991 MT/ Hectare which is higher than the 2019 Maha season average of 2882 MT/ Hectare.

But this adaptation did not take place until lifting the blanket application of subsidized chemical fertilizer. Similarly, many small-scale farmers cultivating other crops also found alternative fertilizer adaptations due to fertilizer shortages. This action did not take place until the subsidized fertilizer was made unavailable, and the subsidy itself was one of the major reasons for inhibiting early adaptations for site specific alternative soil nutrition management practices.

### **Incompetence's in political leadership including incompetent and irrelevant ministers**

Political leadership has failed in understanding complexity of agricultural systems in biological, physical, socio ecological and political interrelationships. As farmers are heterogeneous, they work under different agro ecological regions, their response to policy interventions are in many different ways with multiple outcomes. Given that situation, it takes many years (above 5 years) for this heterogeneous system to evolve and adapt to any transition. This crucial factor was not understood by the political hierarchy which is involved in the policy making process. The political system was so powerful to silence the government officers who are involved in policy making process against expressing their views freely. Country has witnessed secretary of ministry of agriculture position (Who is the highest civil servant responsible for agriculture decisions) was vacated by 3 consecutive secretaries owing to the reason that, they could not work freely under political pressure, more specifically the minister of agriculture himself. Each secretary held the position for less than 6 months period. Due to this, country was unable to stick to one policy to be implemented on agriculture sector. Government directives and gazette notification changes were ad-hoc and frequent over policy changes.

There were several ministers appointed for agricultural sector, with crisscrossing and overlapping mandate. Each minister in charge have failed in understanding the interconnections among sectors, his scope of work and the wholistic view of the country situation. For example, for rice price control there were 2 ministers working in different directions. Minister of agriculture worked on providing a high price for paddy farmers (and to win the confidence of farming community) while minister of trade was working on reducing price of rice which is milled outcome of paddy. Ministers understanding on actual problems faced by farming community was minimal. Response they gave to farmer problems over press conference and televised programs were ridiculous and made them a laughing stock. For the surprise of many, important portfolios were given to handful of these incompetent ministers while there were many competent members of parliament idling due to their lack of internal political power within the party. In other words, even if they were part of government in power, their strength within party internal politics plays a major role in serving the country rather than their knowledge and competencies.

## **4. Effects of food crisis**

### **Fuel price increase and fuel shortage – Effect on agriculture, fisheries and transportation**

Year 2022 witnessed a sharp increase of fuel price across the globe. This was mainly induced by war in Ukraine and the economic sanction imposed on Russia. Increase in fuel prices was felt across all sectors in food supply. Starting from land preparation to harvesting, running cost of agricultural machineries gone up increasing the cost of production. This increased cost was reflected in high farm gate price especially in the paddy sector. On top of this, increase fuel cost has significantly increased the transportation cost by many folds. Transportation cost induced in food prices increase at consumer level was not only confined to locally produced products, but also for imported food items as well.

Paddy harvesting has faced another problem due to fuel shortage. Harvesting of paddy is mainly done using combined harvesters. During harvesting season, paddy across all the paddy lands are harvested within a short time span. If the farmer failed to harvest within the correct maturity period, he may face crop loss. Farmers also hurry to do their harvesting before onset of rain as, if he has to face the rain, there will be huge crop loss again. Due to these reasons, there is always a rush for hiring the combined harvesters during harvesting season. Fuel shortage has affected this rush in a negative way, leaving many farmers unable to harvest their paddy within the correct maturity and climate, causing the farmer some economic loss and the country some food shortage.

Fuel price increase has heavily affected the fisheries sector. Fishing vessels, especially multiday fishing boats required high amount of fuel for their operation. Apart from the effect of fuel price increase, the secondary effect of fuel rationing due to fuel shortage has affected the fishing boats heavily. During shortages, fuel was released only in limited amounts for vehicles, and distribution of fuel in cans was restricted at local filling stations. For these multiday fishing boats which spend around 2 weeks at sea, it was usual practice to get fuel in barrels and cans up to 600 liters per time. During fuel rationing periods, fishing boat owners found it highly challenging to get their barrels filled in front of long queues of vehicles which received only maximum of 15 Liters fuel per filling. This factor limited the number of fishing vessels going to the sea and limited the supply of fish to the market, both sending the price up and reducing availability of protein source for many.

Increased food price was one of the main driving forces behind the inflation which is estimated around 73% at the moment.

### **Food scarcity driving demand pull inflation and increasing food prices**

Food price has seen dramatic increase thus having a separate inflation for food apart from the general inflation country is facing. This high inflation is a result of several distinct factors working apart such as High production cost due to high fertilizer price, lower harvest increasing the unit cost of production, increased transport cost due to fuel price increase and effect of general inflation working along the supply chain. Apart from this, there is a remarkable price change observed due to demand pull inflation effecting on each food item. This is observed for local products which have short supply chain such as egg, jack fruit, bread fruit, cassava, sweet potato, coconut and even for rice during supply shortages. Along with the main food item, prices of food substitutes also start to increase. For example, increase in milk powder price is followed at a similar rate by malted food drinks. Due to increase in demand and supply shortages, these food items show sudden price increase leading to inflation (which is a demand-pull inflation).

The change in prices is not uniform all over the country and varies over different parts of the country in relation to the change of demand. Based on rumors and speculations about sudden food shortage, proposed price hike, disruption in supply chain, fuel shortage and other rumors, market demand for products changes suddenly and price changes are observed within in short time span as low as 2/3 days. Due to rapid increase of price taking place, people just loose the track of price of goods, and start to rely on current market price for food without cross reference. This volatile situation is severe in small villages where handful of store owners control the entire product supply chain and easily manipulate the price based on rumors. This situation has opened up a black-market economy as well, where products with limited supply were hoarded and sold at black market price triggering price escalation along the supply chain. Rural people with lower access to market fall easy pray for these kinds of market manipulation draining out their cash and pushing them towards more vulnerable situations.

### **Effect to urban and rural communities**

Economic and food crisis has highly affected the urban communities with special effect on low income earning groups. Urban communities were the very first group to feel the effect to their day to day life as well. With the forex crisis, availability of domestic gas was started to get low from December 2021. In the urban setting where usage of firewood for cooking was impossible due to being in flats, closed neighborhoods and dangers associated with open fire, most convenient mode of cooking energy was using domestic gas, followed by electric appliances. But preference for domestic gas usage was high due to high cost associated with electricity consumption.

Once domestic gas shortage and price increase become widespread, many people had to wait for long hours in queue, some cases up to 2 days. This had a direct effect on their daily income as most of these urban low-income earners were living on a meager income they get through their daily basis job. Due to already high living cost in these urban areas, these communities have developed a lifestyle where they get their either 1 or 2 of their daily meals from cafes and meal outlets which provide breakfast and other meals. This save them their time in getting ready for work and also comes cheap rather than preparing it at home for a small family. Some living in slum and congested areas have their all 3 meals in this arrangement. As gas shortage became severe and costly, most of these cafes / food outlets closed down their operations, reducing access to food for many.

Migrant urban workers who work at lower monthly wage in factories around Colombo face hardships due food price increase as they are compelled to save bigger portion of their salary and send it back home for family's survival. Increase food expenditure puts both migrant workers and their family's food security at risk. University and professional education students who are studying in Colombo also face severe hardships due to increased transportation, lodging and food costs. Since these students manage their living with a little money they get from their parents or scholarships they receive, their ability to adapt to sudden price change is minimal.

In Sri Lanka, 18.71 % of population lives in urban and semi urban areas. These are the community which is engaged in non-agricultural occupations. Only 9% is reported to have engaged in home gardening in urban areas. During food scarcity and during inflation they are the frontline people who face problem of food insecurity. Especially foods such as vegetables, yams, tuber crops and fruits. They frequently face scarcity of these food items due to crisis such as lockdown periods, food transportation issues due to fuel shortages, strikes and supply chain issues due to other disaster situations. Inflation also plays a major role

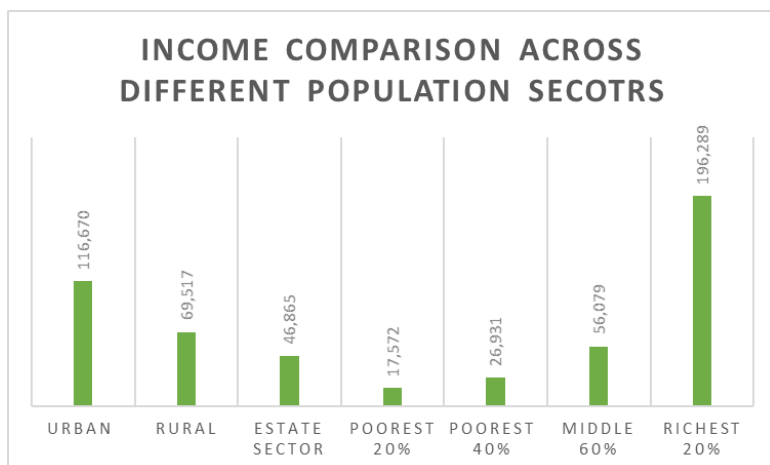
in creating food insecurity for them as these communities entirely have to be dependent on outside purchase of food and the food price hike reduces their purchasing power.

### Rural and estate community

Effects of inflation and food shortage was felt much later and in much lesser extent to the rural community. As they have lower dependency on domestic gas for cooking, with lower transportation needs they have felt the pain to lesser extent. Availability of locally sourced foods such as jack fruit, bread fruit, yams etc., also helped to ease the pressure of inflation. It is reported that 61.5 % of households in Sri Lanka is engaged in home gardening and out of that, 87.8% is represented by rural home gardens. But all the rural community are not such fortunate. One major issue found in rural areas, which is lack of employment opportunities, irregular seasonal and lower paying jobs leaves the labor group highly vulnerable for price hike of food items. Only 16% of the sri lanka population is self-sufficient in rice, which means they grow their own paddy. Other major portion of the population, including urban and rural are depended on rice purchase for their consumption and rice price increase is heavily felt to these groups.

The other sector of population, which is the estate workers sector have a different lifestyle. Even though they live in rural areas with least facilities, they do not own land, limiting their opportunity to engage in agriculture for food. Only 3.1% of estate sector families reported to have engaged in home gardening. Other specialty of their food pattern is that, they are the highest group reported to consume wheat products. 86.3 % of Estate sector families have reported to consume wheat contrast to urban group which is 45.9% in the second place. This high wheat consumption leaves them highly vulnerable for wheat price increase due to import shortages and increase in shipping and transportation costs.

### Income and poverty level of Sri Lankan population



According to department of census and statistics latest data available, which was for the year 2019, urban households (an average 3.7 person per household) earn Rs. 116,670.00, while rural households earn Rs. 69,517.00 and estate sector households earn Rs. 46,865.00 per month. Average household income was calculated at Rs.76,414.00 for the country, while the poorest 40% households earned only Rs. 26,931.00 (77 USD at current

rate) making them unable to put 3 meals per day at current food prices. This situation is more alarming for the poorest 20% of the segment where a family earns only Rs. 17,572.00 (50 USD at current rate) per month. This figure was calculated during 2019, which is prior to income deterioration started to affect in 2020. With the current inflation moving around 50 % - 90 % ability of these low earning families to buy essential food stuff is highly compromised, pushing them in to depth of poverty and hunger. The richest 20% have shown an average household income on Rs. 196,289.00 which has shown a possibility to grow. Still, their purchasing power has fell sharply over the period.

Already the strata of middle income and below is highly constrained due to food inflation. This situation is expected to get worst in coming months. Most recent data collection was done by a household survey conducted jointly by FAO and WFP. The FAO/WFP CFSAM food security survey 2022<sup>i</sup> conducted in September has assessed that, 39.1 % of the population (8.7 million people) were not consuming an adequate diet. This is a drastic deterioration against the previously available data in 2021 third quarter where only 3.4% of households reported inadequate food consumption. As other causes of inflations such as, high fuel and fertilizer price remains high effecting food production and transportation, food price inflation is also expected to increase further.

Many of the people are using food based coping strategies such more often to face the hardships. 46.2% have reduced the size of the portion they consume while 24.2% have reduced the number of meals consumed from 3 to 2. Other coping strategies used were consuming less preferred food, borrowing food, adults consuming less food to accommodate children and other members with need.

Apart from this, many are using livelihood based coping mechanisms. This is a last resort of handling family expenditure where an individual uses one level, and when its exhausted moves further down on a more severe level with higher negative impact. The system is more prominent among most vulnerable lower income earning groups. Nearly half of the country (47.7%) has applied at least one livelihood based coping strategy. These strategies range from

Stress level	Selling household assets
	Spending from savings
	Borrowing money
	Buying food on credit
	Pawning of jewels
Crisis level	Selling productive assets (farming equipments/ vehicles)
	Reducing expenditure on essential healthcare
	Withdrawing children from school
Emergency level	Entire household migrated
	Begged from strangers
	Sold household or land

### Effects of food crisis on nutrition

Food crisis currently faced is making severe impact on nutrition of vulnerable groups. Increasing inflation has affected all levels of daily expenditure. In every family, transportation cost of breadwinner of the family for work, kids going to school, domestic gas and other utility bills has significantly affected the disposable income available for food. On the other hand, food prices have increased by 72.4% in August 2022 over the period of 1 year. This situation is pushing the households to make rational choices in purchasing food items. Most of the families have reduced or completely stopped consumption of milk food, reduced consumption of meat products, fruits and highly limited quantity of vegetables they consume. As the cost gets high, peoples rational choices are pushing them towards filling their hunger rather than focusing on nutrition. They tend to replace expensive food items such as meat, fish, cheese and milk products with cheap food containing more carbohydrate such as rice and wheat products. Trincomalee and Mullaitivu markets have responded their daily vegetable sales were down by 80% - 90%.

This situation is making an impact on nutritional status of the family. Some of the damage made are going to be permanent as in case of pregnant/ lactating mothers, infants and kids etc.,

A doctor from the state children cancer hospital “Apeksha hospital” shared with media an alarming situation he has found with his patients. Out of 50 children he has surveyed in the hospital, 15 children are found to be under acute malnutrition. Due to financial constraints, hospital food program had to reduce its food quality and long-term patients were thus affected. Apart from the hospital, similar situation can be expected all over the lower income families due to high price of protein and other nutritious foods.

Quality of food consumed is reducing at a very high level. Especially all the protein component of foods are becoming very expensive. Price of chicken and eggs has been more than doubled. According to FAO/WFP CFSAM food security survey 12. 9% of the poorest households have not consumed protein food for past 7 days while 69.9 % of them again have not consumed iron containing food during the same period.

### **Paddy sector**

Effect of chemical fertilizer ban was first felt and challenged by the paddy sector. It was the paddy farmers who initiated the first protest against the government due to the chemical fertilizer shortage. As paddy was a short-term crop (only 3 months) its response to chemical fertilizer is high (Especially In the dry zone). If the farmer failed to apply chemical fertilizer at the prescribed short intervals, the loss on crop yield is significantly high. Sudden ban on chemical fertilizer as well as agro chemicals used for pest control left the farmers in a confused state on how to perform the farming activities they were used to. This panic has left some of the farmers to miss the cultivating season leading to reduction in extent of cultivation.

The lower extent of cultivation and lower yield have reduced the paddy harvest. But the lower yield has created a demand for paddy increasing the price. Due to this reason, farmers were able to obtain much higher economic return in the 1<sup>st</sup> season. High price pushed all the farmers to continue farming during the 2<sup>nd</sup> season. Also as they can expect high price, farmers were willing to pay exorbitant prices for black market chemical fertilizer. This has created a huge black market for hoarded chemical fertilizer. (By the time government-imposed ban on chemical fertilizer importation, there was imported fertilizer already enough for 1 more year) Immediately with the ban, many wholesalers have hoarded chemical fertilizers and those were slowly released to the market following the price increase. This fertilizer price increase again reflected in the increase of paddy price triggering a price increase along the food chain.

Conversion of paddy in to edible rice involves the process of rice milling. Rice milling was done by millers across the country, but over the past 2 decades, the major controlling stake in paddy milling process came in to the control of 4 market players. All these 4 private millers (namely brands Araliya, Nipuna, Rathna and New Rathne) were located in the Polonnaruwa district which is centrally located to major paddy producing area of the country. Their combined financial and storage capability of buying and storing major portion of entire paddy harvest of a season puts them in s monopolistic position to decide the price of this staple food. With each season, there used to be a fresh round of rice price hike. Currently price hike has frequented and well-orchestrated that, these 4 market players create artificial demand and panic by regulating rice flow to the market and creating price increase. Due to combination of above production cost based, inflation based and market forces-based factors, rice price has been moving in an increasing trend. As rice was the staple food in the country, its increase significantly contributes to the inflation calculated.

## Vegetables, fruits, pulses

During the time of preparation of this report, production data was available only up to 2022 March in the Hector Kebbekaduwa Agrarian Research and Training Institute (HARTI) monthly food information bulletin. As a reference year, 2019 was selected as 2020 and 2021 production situation was skewed due to covid 19 restriction related production issues. Considering the vegetable production volumes compared with 2019 March, 2022 has reported increased production levels despite chemical fertilizer issues. Main justification that can be made regarding this is that, limited stocks of chemical fertilizers were available by the time of chemical fertilizer ban in 2021 May. With the ban, a scarcity was created sending the price up. Due to scarcity and high price of chemical fertilizers and availability of government provided organic fertilizers, farmers have been using both. It is a well-established scientific fact that, chemical fertilizers used combined with compost and other soil conditioning organic fertilizers will increase the yield. This is the conclusion that can be made from the current data available and this claim has to be further verified in detailed research over cultivating seasons in the future. This observation was also contrast to the farmer survey results conducted (by verité research) soon after the chemical fertilizer ban was imposed. For the survey, 85% of the farmers responded an expectation of yield reduction and half of them feared crop loss up to 40%.

Paddy varieties currently cultivated are specially developed high chemical responsive and high yield varieties. That was evident with the reduction of paddy yield by considerable level from 2.901 mn MT in 2019 to 2.314 mn MT in 2022.

Only red onion has shown reduction yield which is a staggering 15,000 MT. This is mainly due to lower extent of cultivation. But all the other crops have remarkable increase in yield, by means of expanded cultivation extent as well as yield improvement with combination of chemical and organic fertilizer usage. Fruits export volume has increased by 160% during the period.

Crop	2019 March (Yala) MT	2022 March (Yala) MT
Paddy	2.901 mn	2.314 mn
Green chilli	36,228	37,151
Red onion	38,798	23,079
Potato	36,586	38,930
Green gram	4,762	6,290
Cow pea	6,064	6,255
Up country vegetables	219,832	246,679
Low country vegetables	245,306	299,166
Fruits (Export)	832	1,338

## Tea

Sri Lanka produced around 300 mn kg tea per year with an export revenue of 1.25 bn USD. According to a survey conducted by verité research, 89% of tea lands within Sri Lanka (Estate sector and small holder) depend on chemical fertilizer for their tea lands. In a similar survey, estate sector managers have responded they are experiencing up to 40% yield drop due to fertilizer ban. Small holder tea land owners have reported yield loss of around 30% during the survey. But the made tea production figures from 2007

to 2021 do not show any change in yield. May be this is due to availability of fertilizer stocks at the estates, but the period from 2022 January to April have reported lower than average yield showing that yield loss is taking place.

Year	2017	2018	2019	2020	2021	Jan-Apr 2022
<b>Total tea production (MT)</b>	307,080	303,843	300,134	278,489	299,338	86,232

International tea price remained floating around the same range for the past few years, but the rupee depreciation had a positive effect on the price paid to tea leaves. Price of raw tea leaves which were in the range of Rs. 100.00 during 2019 was being paid above Rs. 230.00 during 2022 May. This situation was a relief to small holder tea farmers to compensate some yield loss and against inflation.

### **Export agriculture crops**

Export agriculture sector, represented by cinnamon, pepper, cloves, nutmeg, vanilla and cardamom were the only sector to perform well during the crisis period. Main reason for that was, they were being independent of chemical fertilizer requirement for cultivation and higher price received at the export market due to depreciation of rupee. In fact, only the export agricultural crops acted as a better investment against the inflation. Many entrepreneurs were observed to be investing in cultivation and expansion of cinnamon during the 2020 /2021 period.

### **Green houses and protected agriculture**

Protected agriculture/ greenhouse technology has received significant interest during 2019/ 2021 period due to high export and local market demand for some specific crops such as MICH chilli, Muria capsicum, bell pepper, tomato and green chilli. Cleaner and eye catching crops produced in green houses fetched high market price. Crop production under protected agriculture technology increased yield by 2 to 4 times higher than the normal conditions. Due to this reason, it was accepted as an easy way of cultivating crops which can be managed using low human labor. High cost of establishment was also able to be recovered within 3 seasons due to high price and high volume of production.

But these protected agricultures needed chemical fertilizer for plant nutrition when operated in commercial scale. Chemical fertilizer ban imposed proved to be a disaster for this sector as the high intensity input needed were abruptly stopped leaving the plants to get stunted in the green houses. Many enterprises which has ventured as recently as 2020 were left unable to recover their investment due to sudden fall of the sector. As this was a new sector, there were no data available on crop production for further analysis of effects of chemical fertilizer ban.



## 5. Recommendations and options for way forward

### Strengthening small scale farmers

As per the 2014 census, total of 4,302,214 operators were engaged in agriculture. Out of this 66% was having a land extent of less than 2 acres thus considered small scale farmers. Again, out of the total operators, 46.1% was having a land extent of less than 40 perch (1/4<sup>th</sup> of an acre) which falls within the category of home gardens. Once taken the home garden sector out, the operators having more than 40 perch and have also disclosed that, 33% of them produce for consumption and 67% produce mainly for sale. Based on these figures, it can be easily understood out of total agriculture producers, 63.8 % is mainly producing for consumption (subsistence farmers), while remaining 36.2% is the market-oriented producers. Number of home garden owners were reported to be 61%. Even though the number of market producers are low, the land extent they represent is high, thus they were able to produce surplus amounts supply to the entire country and for export.

Considering these figures, the best solution for improving food security is to strengthen home gardening sector as a larger percentage of the population was engaged in some kind of home gardening. Strengthening the home garden sector provides solution to fertilizer shortage as well. As the small-scale farming is easy to be adapted to organic farming conditions, where organic fertilizers and pesticides can be prepared from locally available materials, including crop waste and kitchen waste.

The statistics demonstrate only the agriculture operators with less than 40 perch land at 46.1 %. There are still a large number of families that have small land parcels and not engaged in any agricultural activity aimed even at fulfilling own consumption needs. Following that, there comes the urban community where land extent is not included in statistics, but are capable of implementing urban gardening techniques within the space available. Taking in to account all these groups together, the home gardening can be a permanent game changer in the process of achieving food sovereignty. Possibility of local sale of excess products, reduced need of long-distance transportation to tackle high transportation costs, reduction of food waste along the supply chain and reduced post-harvest loss due to harvesting of only the needed amount are some other solutions home gardening offer to the problematic food sector.

### Cashing on the community exposure and experience obtained on organic farming

Sri Lanka initiated the organic farming policy in 2021 May due to lack of foreign exchange to import chemical fertilizer and being unable to offer fertilizer subsidy. But 1 year later, when the chemical fertilizer ban was lifted, global scenario has been changed where chemical fertilizer price has sky rocketed within a very short period. 1 Metric ton of Urea which was at 330 USD in 2021 May was traded at 925 USD during 2022 April tripling its price within 1 year. Increase in global shipping cost will also add to this, further increasing the price. It is further predicted that there would be severe fertilizer shortage in the near future and price change would be unpredictable high. Regardless of the government policy to go organic, this situation makes the farming a costly profession. Despite high cost, farming has climatic and other uncertainty associated making it risky business. The rational choice farmer has to make is to turn his farm in to a sustainable low external input model. The 1-year experience obtained in organic farming proves valuable in this exercise.

Chemical fertilizer scarcity created during the 1-year period compelled the farmers to practice their farming activities with locally made organic fertilizers. The need to find alternatives due to scarcity has led

farmers themselves looking for alternatives, learn from their peers, try out alternatives and share success stories among them. This necessity-oriented learning process made a good foundation for improving their farms over the successive seasons. Similar changes were observed among the agriculture officers' level, where they have ventured in to learning process and provided practical advice and trainings. Due to the market demand, some entrepreneurs have ventured in to organic fertilizer production within villages increasing access to fertilizer. The experience obtained over the past year has shown that, using organic fertilizers as a soil conditioner can enhance the soil and effectively improve responsiveness to chemical fertilizers and increase the yield. Meanwhile some key farmers in villages have mastered the art of organic farming earning the title of being village model farms. These were some of the positive changes observed during the 1 year of going organic.

To face the future chemical fertilizer price crisis, it would be best to cash on the organic farming experience obtained to implement low external input based sustainable farming models across all possible small-scale farms and home gardens.

### **Establishment of national organic agriculture research, training and promotion institute**

Increasing trend of agriculture input prices clearly demonstrate requirement of local input solutions for strengthening agriculture sector. Organic farming, permaculture, agroforestry and bio intensive farming are some of the sustainable farming methods that use local inputs and ecological conditions for crop production. More or less, many of these farming methods fits in to the broad definitions of organic farming, thus considered branches of organic farming. As lack of proper knowledge on organic farming among the farming community as well as the agriculture officers' levels was identified as a major drawback for failure in going organic, a centralized training center is observed as essential.

Government officers and farmers have understood organic farming basically as a process which replace chemical fertilizer with compost/ liquid fertilizer and avoiding using pesticides. But the real organic farming process has much deeper roots in connecting with ecology and natural processed where farmer have to understand how each and every action he takes will enhance or degenerate the natural process. Knowledge that key players in the farming sector missed was principles of organic farming, Living soil, Soil health and soil enrichment, Natural processes and sustainable farm practices, integrated pest management and Regulations of organic farming in a structured way. Without understanding these concepts and methodically developing the farm accordingly, productive results of organic farming can not be expected.

Lack of understanding of these concepts among government agriculture officers and their inability to guide the farmers on a proper path was a primary reason for failure and lack of understanding among farming community on these principles was the secondary level reason for failure. The National training center on organic farming will act as a one stop solution center for providing structured trainings to all levels of agriculture sector from policy making to farmer level. To achieve this, center has to do multiple roles of conducting organic farming research, knowledge hub, training center and organic farming promotion center.

This training center should conduct necessary research on solutions for burning issues of farmers, such as

- Easy methods of fertilizer production, and different raw materials for different geographic regions
- Liquid fertilizer production, EM (Effective microorganisms) culture

- Storage methods of solid and liquid fertilizer, their quality changes over time and methodologies for increasing shelf life
- Organic pesticides and controlling other agents, methods, cultural practices
- Management practices for yield enhancement
- Methods of resource recycling within a farm and farm sustainability
- Water use efficiency

Not only confined to its own research, this center should be a place where indigenous knowledge and farmers own experience/ research is collected for review, verification and made available for wider use. Since crop related cultivation, management and pest control practices can vary across different geographic and climatic regions, organic agriculture practices applied also varies. Collection of indigenous knowledge and farmers experience provide huge leap through in farmer knowledge building. Along with this research and knowledge gathering, there should be an established efficient knowledge sharing and extension mechanism to disseminate this knowledge as well as to promote organic farming.

Looking at the broader picture, Sri Lanka by cashing on the organic farming initiative already made and investing further on developing the sector, can be promoted as an agro tourism destination for the worlds growing organic farming enthusiasts. To attain that, a national level training and research center on organic farming can be a great foundation. Elevated to the level of having a panel of lecturers and status to offer certificate course / diploma in organic farming, this center can be promoted as an international training center among international community (farmers, entrepreneurs and others) who are keen on learning organic farming.

### **Small scale protected agriculture models for urban farming**

In journey of achieving food sovereignty among all layers of the people, urban community represents an important part which has to be considered with much emphasis. During all the crisis periods, agriculture extension services and agricultural programs in media have highlighted and provided important tips in urban gardening. Most of these gardening techniques promoted are focusing on low space agriculture such as planting in pots, vertical gardens etc.,

These techniques have been followed by many, but effectiveness and continuation of these urabn farming remains low. Major reason for that situation is that, many people who are engaged in other jobs have initiated potted farming during crisis periods and especially when the climatic conditions are favorable for farming. As time goes on, where both husband and wife are employed amount of time they get to attend to these plants gets limited. Especially when climatic conditions are not favorable, these plants do not get the care it needs. During dry periods, and especially day time, these potted plants do not get watered frequently and once the water in the pot dries the plant get wilted and damaged. Similarly, during wet seasons, these plants get too much water filled in the pots and gets damped and damaged. As these pots hold limited amount of soil, the attention required is much higher than the level that can be given by working couples. Once these hard-established plants have died halfway in their life cycle, these people get discouraged and do not continue the farming activity.

Therefore, there is an identified need to introduce small scale protected agriculture units in to the urban garden model with simple drip irrigation technique, which is easy to maintain. The model should be simple with least maintenance where the any person can check the watering situation even during night time. Protected agriculture unit with a UV resistant polythene, the structure and drip irrigation system using

small drippers or plastic bottles can do the trick. To keep the cost minimal, the model can be prepared using recycled materials. With the protected agriculture unit, it will minimize the plants' shock to sudden climatic changes during the day time and allow the household owner to adjust to changes gradually. The other major advantage observed in the protected agriculture unit is that, with better humidity and controlled conditions, crop production is increased by 2 / 3 folds, fulfilling food needs within a limited space as well as keeping the interests of the household owner towards continuation of the farming activity.

### **Educating on being creative with food**

During the food crisis, one major problem parents face is balancing the food expenditure and nutritional requirements. This problem becomes severe if there are small kids at home. To handle this problem, parents have to find creative ways with food, to make them more appetizing. There are many underutilized and nutritionally valuable foods found in abundance. Production and promotion of these food preparation techniques in short video clips and making them available over mass media and social media will provide some tips for parents to provide more nutritious food in an economical way.

### **Advocacy on agriculture intellectuals, academics to be impartial on political views, to raise their voice to food sovereignty, country and its people**

Silence of intellectuals and their inability to raise their voice and concerns over matters of national interest was one main reason leading the country towards this food crisis. There should be a proper way to communicate their concerns in a way that is well heard and ideas were incorporated. To achieve this, these intellectuals should unite politically. There should be some advocacy programs to bring impartial agriculture intellectuals working on a goal towards food sovereignty.

### **Improving cattle farming at small scale**

Implementing small scale cattle farming units at villages can be a solution to many problems faced. It can fulfil local need of fresh milk, organic fertilizer (cow dung, cattle urine), can be used to produce biogas providing a solution for domestic gas shortage and source of meat.

### **Strengthening home garden crop diversity**

Strengthening home with crop diversity can increase resilience of the home garden to long term crisis periods and can be a source where it can provide balanced nutrition.

### **Reducing post-harvest loss and transportation loss**

Implementation of programs towards good practices of harvesting and transportation to reduce postharvest loss and transportation loss will make more food available for consumption.

### **Promotion of backyard poultry farming**

As many protein sources are getting expensive, eggs can be named as a cheap and easy protein source. Promotion of backyard poultry programs can cater both egg and chicken requirement at local level.

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