BASE LINE SETTING AND M&E MANUAL

FOR
TANZANIA NATIONAL RICE DEVELOPMENT STRATEGY
(TZ-NRDS-II)

FINAL REPORT
VOL. I
MAIN

BASE-LINE SETTING

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18 August 2022

EXECUTIVE SUMMARY

1) The work reported here was designed to select the source and value, to use in setting the baseline for each indicator of the Tanzania National Rice Development Strategy, phase 2 (NRDS-II). This process involved the collection and analysis of secondary and primary data. The analytical framework used included triangulation and Data Quality Assessment. In order to guide and replicate the same approach during M&E this executive report is focused on the methodology that was used in setting the baseline.

Identification and Assessment of Sources of Secondary Data

2) Eight potential secondary sources of data for setting the baseline as well as for monitoring and evaluation (M&E) of the indicators of NRDS-II; were identified. These are:
   a) Agricultural Routine Data System (ARDS) of the Agricultural Sector Lead Ministry (ASLMs);
   b) National Sample Census of Agriculture (NSCA), by National Bureau of Statistics (NBS);
   c) Agricultural Statistics (AGSTAT) for food security of MoA
   d) Food and Agriculture Organization Statistics (FAOSTAT);
   e) Agricultural Annual Sample Survey (AASS) of NBS
   f) Basic Data Book (BDB) of MOA;
   g) National Seed Catalogue of Tanzania Official Seed Certification Institute (TOSCI); and
   h) Reports of Fertilizer Use, from the Tanzania Fertilizers Regulatory Authority (TFRA).

3) Assessment and extraction of secondary data and information, was through:
   a) Meetings and consultations with the custodians of each of the database.
   b) Desk reviews and Key Informants Interviews (KIIs), including (i) collectors of primary data at village and ward levels; (ii) processors of data at district, regional and national levels; (iii) managers and directors at national level.
   c) SWOT analysis of each of the databases.
   d) Review of the reports emanating from each database, in relation to capturing data required for the baseline as well as the M&E of NRDS-II indicators.

Collection and Processing of Primary Data

4) Field surveys and primary data collection was conducted using multi-stage approach of purposive, area, and snowball sampling. Eight (8) districts were purposively selected. The selected districts came from the three major ecologies producing rice in Tanzania, i.e., Southern Highlands, Eastern and the Lake zone. These included the leading district for production of rice which each zone. More districts were chosen in Morogoro regions as it provides the largest numbers of district in the top 20 rice producing districts in the country. The purpose was:
   a) In-depth verification of data feeding into ARDS, AASS as well as M-Kilimo[1]; and
   b) Primary data collection for indicators to validate data from existing databases.

5) With respect to the ARDS, AASS and M-Kilimo databases:
   a) The main focus was to validate the processes of data collection from village levels and feeding upwards to the district, regional and then national levels.
   b) The main respondents were Regional Agricultural Advisors (RAA); Regional, District Agricultural, Irrigation and Cooperative Officers (DAICO) and District Statisticians (particularly those who are directly engaged in the ARDS); Village and Ward Agricultural Extension Officers (VAEOs and WAEOs).

[1] M-Kilimo is still under development and thus it is not yet able to provide data for M&E but has potential

6) KIIs were conducted with rice millers (mainly through managers and supervisors) to collect data for Indicator 7 (*Level of industrial milling capacity (%)*). A total of 173 milling enterprises were surveyed in Mbeya, Morogoro, Shinyanga, Simiyu and Tabora regions.

7) KIIs with managers, and/or supervisors of supermarkets to collect data for Indicator 9 (*Share of local rice in the market (%)*). A total of 21 supermarkets were surveyed in: Arusha city (10), Mbeya city (3), Dodoma city (3) and Morogoro Municipal (5). The purpose was to find out proportions of local and imported rice products that are sold in the supermarkets. Information was also gathered with respect to brands of imported rice, branding of locally produced rice, and prices. However, efforts must be made to enable routine collection of such data by the ARDS system, to enable adequate M&E of Indicator 9.

8) Eight irrigation schemes were also surveyed in the five regions. In the five regions surveyed Focus Group interviews with leaders of Irrigation Organizations (IOs) to collect data for
   (i) Indicator 11 (Smallholder farmers' (SHFs) access to financial services (%)) and
   (ii) indicator 12 (Smallholder farmers' accessibility to technical training and services (%)).

9. Data Quality Assessment was done on the eight main data sources with respect:
   i) **Validity**: This involved checking how suitable is the methodology used by the source provides the best national level data for measuring an indicator.
   ii) **Consistence**: This involved checking whether similar methodology of data collection is used across different locations and over time.
   iii) **Timeliness**: This involved checking whether data can be accessed from custodian at clearly defined regular interval.
   iv) **Completeness:** This involves checking the extent how required data were collected (whether there are gaps or missing data) across locations and over time.
   v) **Accuracy:** This involves checking how data collection and handling processes are ensure less or zero errors.
   vi) **Relevance**: This involves checking how data collected by the custodian is considered useful in decision making and accepted by authorities.

10. Then, descriptive analysis with Microsoft Excel was used in data analysis.

Conclusions

11. Availability of statistical data from secondary sources, for the baseline and M&E of the NRDS-II, is significant in quantity. However, there is a challenge that no actual measurements are used to collect the data, except for the irrigation, seed and fertilizer databases.

12. No single data source may be used for setting the baseline for all 14 indicators of NRDS-II, but there are four main consistent databases that jointly account for 12 of the 14 indicators. The only indicators where there is no routine data being generated for, are indicators number 14 (Post Harvest loss (%)), and number 9 (share of local rice in supermarkets (%)).

13. The rice stakeholders consulted (members of NRDS Task Force and District officials in Kyela, Mbarali, Ifakara TC) have strongly suggested that production should be measured by area planted with paddy, rather than "area harvested". Measuring area harvested alone will not give a complete picture of the challenges that farmers are facing in production (leading to failure to harvest a portion of the crop). These occur more often than not, which makes cost of production to be high and hence reduce competitiveness. It is concluded that this makes sense from the point of costs-benefit assessment.

Recommendations

14. In order to respond to the concerns of the rice stakeholders of Tanzania, while enabling consistency in monitoring all indicators in all CARD member countries:

    a) For Indicator 2, both Area (Ha) harvested and Total Area (Ha) planted, with Paddy, shall be monitored and reported; and

    b) For Indicator 3, both Yield per Unit of Area planted (MT/Ha) and Yield per Unit of Area harvested (MT/Ha), shall be calculated and reported.

15. The recommended baseline figure for the 13 indicators as per the findings of the assessment presented in this report, are as follows:

Indicator Variable		Recommended Base-line Value	Baseline Year[2]	Data Source Year[3]
1) Quantity of paddy production (**Million MT**)		3.38	2019/2020	NBS (2021)
2) (a)Total area (**Million Ha**) planted with paddy		1.69	2019/2020	NBS (2021)
(b)Total area (**Million Ha**) harvested with paddy		1.49	2019/2020	NBS (2021)
3) (a) Yield (**MT/Ha**) per unit area planted		2.00	2019/2002	Calculated
(b) Yield (**MT/Ha**) per unit area harvested		2.30	2019/2020	Calculated
4) Self-sufficiency rate **(%)**		224.00	2017/2018	URT (2019)
5) Area (**Ha**) under irrigation for paddy production		80,370.00	2019/2020	NBS (2021)
6) Quantity (**MT/year**) of seed of resilient varieties		397.80	2019/2020	TOSCI(2020)
7) Level of industrial milling capacity **(%)**		58.00	2018/2019	Survey2022[4] ARDS
8) Level of mechanization in production (**Nos of Machinery**)	a) Tractors	4,096.00	2018/2019	ARDS
	b) Power tillers	5,635.00	2018/2019	ARDS
	c) Combine harvesters	267.00	2018/2019	ARDS
9) Share of local rice in the market **(%)**		85.40	2022	Survey 2022
10) Quantity **(MT/yr)** of seed of high-yielding varieties		359.30	2019/2020	TOSCI (2020)
11) Smallholder farmers' accessibility to financial services **(%)**		3.80	2019/2020	NBS (2021)
12) Smallholder farmers' accessibility to technical training and services **(%)**		7.00	2019/2020	NBS (2021)
13) Fertilizer utilized (kg/ha) by farmers in paddy production		28.00	2017/2018	TFRA (2020)
14) Post-harvest losses **(%)**		N/A	2021/2022	AGSTAT[5]

16. It is also strongly recommended that efforts should be made to merge the AASS of NBS, with the ARDS of ASLMs, so as to strengthen quality of data collected for each Agricultural Year (October – September) – to enable quality M&E of, not just the NRDS-II, but the entire agricultural sector. It is also recommended to undertake sampled actual measurement to improve quality of data. The significant increase of the budget for agriculture, requires that M&E is also strengthened to drive the increased return from investment. The merged ARDS and AASS should be the main custodian of data, and should be improved and accommodate dataset from AGSTAT, TOSCI, NIRC, TFRA and others.

[2] The year data was collected

[3] The year the report was published

[4] This is the survey done by the Consultants, as reported in this report

[5] The Directorate of National Food Security (DNFS) is undertaking some studies to establish the current status. It is therefore recommended that the setting of baseline for this indicator should wait until studies carried by DNFS, have been completed.

17. Therefore, the M&E Manual (Vol. 3) emphasizes the **monitoring and evaluation of** plans, budgets, activities, and outputs of a multitude of independent actors (public and private) who influence, support and/or work in the Rice Sector. The aim should be to influence each critical stakeholder/actor, to make necessary and sufficient inputs to produce necessary and sufficient outputs that contribute to the delivery of the planned outcomes and impacts of NRDS-II. This is because, by its design NRDS-II is not a single program with full control of all inputs (especially financial), activities and outputs required to deliver its strategic goal.

18. For this reason, it is recommended and included in the M&E Manual, that NRDS-II TF should effectively communicate, share and put the necessary findings, interpretations and recommendations of M&E, in the hands of the key actors in the rice sector of Tanzania.

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ACRONYMS

ARDS	Agricultural Routine Data System
AASS	Annual Agricultural Sample Survey of NBS
AGSTAT	Agricultural Statistics for Food Security
ASDP-II	Agricultural Sector Development Strategy phase II
ASMLs	Agricultural Sector Lead Ministries
BDB	Basic Data Book (of the MoA)
CARD	Coalition for African Rice Development
DAICO	District Agriculture, Irrigation and Cooperatives Officer
DC	District Council
DMI	Division of Mechanization and Irrigation
DNFS	Division of National Food Security
DPP	Division of Policy and Planning
DTER	Division of Training, Extension and Research
GoT	The Government of Tanzania
IOs	Irrigators Organizations
JICA	Japan International Cooperation Agency
LGAs	Local Government Authorities
MDA	Ministries, Departments and Agencies
M&E	Monitoring and Evaluation
MoA	Ministry of Agriculture
MIIT	Ministry for Investment, Industry and Trade
MTs	Metric Tones
NBS	National Bureau of Statistics
NSCA	National Sample Census of Agriculture
NIMP	National Irrigation Master Plan
NIRC	National Irrigation Commission
NRDS	National Rice Development Strategy
NRDS-TF	NRDS - Task Force
PO-RALG	President's Office-Regional and Local Government Authorities
QDS	Quality Declared Seeds
SACCOS	Saving and Credits Cooperative Societies
SWOT	Strength, Weakness, Opportunities and Threats/Challenges
TARI	Tanzania Agriculture Research Institute
TAICO	Town Agriculture, Irrigation and Cooperatives Officer
TFRA	Tanzania Fertilizer Regulatory Authority
TMA	Tanzania Meteorology Agency
TOSCI	Tanzania Official Seed Certification Institute
UDSM	University of Dar es Salaam
VAEO	Village Agricultural Extension Officer
VICOBA	Village Savings and Landing Associations (VSLA)
URT	United Republic of Agricultures
WAEO	Ward Agricultural Extension Officer

1. INTRODUCTION

1.1. Background

1) Tanzania is among the top five leading rice producing countries in Africa, together with Egypt, Nigeria, Madagascar and Mali. Also at global level, Tanzania is ranked at number 22 out of 119 countries by the amount of rice produced per country (https://www.atlasbig.com/en-au/countries-by-rice-production). Therefore, Tanzania is a key player globally in terms of supply of rice.

2) When the National Rice Development Strategy II (NRDS-II) is fully implemented with a high level in delivering its goals, Tanzania will go even higher on the chart of leading producers of rice in the world. This is because the key results of NRDS-II, include the expansion of production (MT of Rice per year) by **Four Folds** (*doubling the yield per hectare and doubling the area under paddy cultivation*) by year 2029/30, compared to 2018/19. This report is about how progress of implementation, results and outcomes will be measured, evaluated and ensured.

3) In the 2022/23 budget estimates approved by the National Assembly of the United Republic of Tanzania (URT), the Agricultural Sector got a huge boost in terms of priorities of the Government of URT. For example:

   (a) Paragraphs 38 and 39 of the budget speech, include the following commitments:
   i) *…to increase the agricultural budget from 294 billion shillings to 954 billion shillings and will continue to increase the budget each year*. The aim is to:
   ii) *achieve more than 10 percent growth for the agricultural sector by 2030*;
   iii) *ensure food security and supply to cater for domestic demand and export*;
   iv) *increase the value of export of agricultural produce from USD 1.2 billion to more than USD 5 billion by 2030*;
   v) *expanding the irrigation area to 8,500,000 hectares equivalent to 50 percent of the total area cultivated in the country by 2030* – this will include - *the scaling-up of small-scale irrigation schemes across the country by constructing irrigation infrastructure including the construction of dams for harvesting rainwater and use of available water bodies like Lake Victoria, Tanganyika, Nyasa and large rivers like Malagarasi, Ruvuma, Rufiji, Mara, Pangani and Ruvu*.
   (b) *There are other initiatives by the URT such as "Building a better tomorrow" through block farms and Agriculture Input Support Project (with 3 selected commodities including rice) that is funded by AfDB and JICA*.

4) The NRDS-II and the support of the Coalition for African Rice Development (CARD) should aim to effectively respond and use these ambitious intentions of the Government of Tanzania, to ensure the goals set are achieved.

5) CARD is a consultative group, supporting the development of the rice sector in 32 Sub-Saharan African (SSA) countries including Tanzania. Members of the group include bilateral and multilateral donors and African/international institutions. These are:
   a) **Africa Sub-regional Organizations**: Common Market for Eastern and Southern Africa (COMESA); East African Community (EAC); Economic Community of Central African States (ECCAS); Economic Community of West African States (ECOWAS); and Southern Africa Development Community (SADC);
   b) **Africa-wide Institutions**: African Development Bank (AfDB); African Union Development Agency (AUDA-NEPAD); Alliance for a Green Revolution in Africa (AGRA); African Agricultural Technology Foundation (AATF); Forum for Agricultural Research in Africa (FARA); and AfricaRice.

c) **United Nations and other Global Organizations**: World Bank (WB); Food and Agricultural Organization of United Nations (FAO); International Fund for Agricultural Development (IFAD); World Food Program (WFP); International Rice Research Institute (IRRI); and Islamic Development Bank (IsDB).
d) **Japanese Organizations**: Japan International Cooperation Agency (JICA) and International Research Center for Agricultural Science (JIRCAS).

6) CARD is now in its 2nd phase, which aims to again support and enable the doubling of rice production in SSA, from 28 MMT (million metric tons) in 2018 to 56 MMT in 2030 to bridge the demand-supply gap. This target figure was set at the launch of the CARD Phase 2 in August 2019, using the latest data available with the year 2018 as the benchmark for paddy production. To achieve this goal, the CARD supported member countries, for each to prepare or revise its National Rice Development Strategy (NRDS) and its implementation. Tanzania is currently implementing the National Rice Development Strategy (phase II) that was launched in 2019.

7) The Objectives of the Tanzania National Rice Development Strategy (phase II) (Tz-NRDS-II) (MoA and JICA, 2019), are as follows:
a) **Vision:** A vibrant rice industry through productivity and markets, providing employment along its value chain in the region.
b) **Goal: S**ustain national self-sufficiency in rice production, contribute to the regional self-sufficiency and become a market leader in the region.;
c) **Strategic Objectiv**es:
SO1: Improve Climate resilience by developing market-oriented varieties and promoting other production technologies and policy tools that could mitigate the climatic vagaries.
SO2: Enhance Regional market competitiveness of locally produced rice over the imported Asian and other regional rice varieties by reducing the costs of production and improving the quality and regulatory mechanisms.
SO3: Sustainably orient Tanzanian rice farming system, especially smallholdings toward national and regional rice markets through improved production and marketing. mechanisms.
SO4: Expand rice cultivable area under irrigated, rain-fed lowland and upland ecosystems through new establishments and rehabilitation of existing irrigation infrastructures and management capacities.

1.2. Setting the Base-Line and M&E Manual for NRDS-II

8) On 25th April 2022, the Government of Tanzania with support of Japan International Cooperation Agency (JICA) Tanzania Office, signed a contract with Hatibu and Shetto Consultants, under which the Consultant agreed to develop a baseline and a M&E Manual for the Tanzania's NRDS.

9) In the report of the inception phase of this assignment, it was concluded that all the indicators set by the NRDS-II are aligned (*only minor wording changes are necessary*) with the 12 CARD indicators. An additional two Tanzania (Tz) specific indicators were also adopted giving a set of 14 indicators. The baseline setting for each indicator was guided by the definitions as presented in Table 1

Table 1: Definition of Indicators of Tanzania NRDS-II covered in this Report

Category	Indicator Variables	Definition/description
CARD Overall	1) Quantity of paddy production (Million MT)	Quantity of paddy produced locally
	2) (a) Total area harvested (Million Ha)	Total rice area harvested
	(b) Area Plated with paddy (million Ha)	Total area planted with paddy[6]
	3) Yield per unit area (MT/Ha)	Average quantity of paddy grains produced per hectare of land planted and/or harvested with paddy
	4) Self-sufficiency rate (%)	Coverage rate of rice needs by local production
CARD Resilience	5) Area under Irrigation (Ha)	Area under rice cultivation with supplementary irrigation that could mitigate the negative impacts of weather fluctuations on rice production
	6) Quantity (MT/year) of Seeds of Resilient Varieties	Quantity of seeds of locally preferred varieties with resilient characteristics, locally produced and/or imported annually
CARD Industrialization	7) Level of industrial milling capacity (%)	Ratio of installed capacity of medium and large mills among all functional mills
	8) Level of mechanization in production	Number of machines (tractors, power tillers, combine harvesters) available for ploughing and harvesting (in rice producing areas)
CARD Competitiveness	9) Share of local rice in the market (%)	Share of locally produced rice in the total quantity of rice procured by major retail stores for a year
	10) Quantity (MT/year) of Seeds of High-yielding Varieties	Quantity of seeds of locally preferred varieties with high-yielding attributes, locally produced and/or imported
CARD Empowerment	11) Smallholder farmers' accessibility to financial services (%)	Percentage of smallholders in pre-selected farmers' groups/associations regularly accessing necessary financial services (in rice producing areas)
	12) Smallholder farmers' accessibility to technical training and services (%)	Percentage of smallholder in pre-selected farmers' groups/associations regularly accessing necessary technical training and services (in rice producing areas)
Tz -Specific	13) Fertilizer utilized (kg/ha) by farmers in paddy production	Amount of fertilizer utilized (Kg/ha) by smallholder farmers in paddy production
Tz -Specific	14) Post-harvest losses (%)	(%) of harvested rice that is lost before reaching the final consumer (at harvesting, processing, and transportation to the final consumer)

10) The following data systems were identified and used as key sources for the data required for both the baseline as well as the M&E of NRDS-II:

a) The National Sample Census of Agricultural (NSCA), by the National Bureau of Statistics (NBS). This is conducted at intervals of 10 years, and the most recent was conducted in (2019/2020), and the report was published in 2021.

[6] The Tanzania rice stakeholders consulted during this process of setting the baseline for NRDS-II, strongly recommended that Yield should be measure against the total area planted with paddy, rather than area harvested. This is so as to adequately measure yields against all inputs from land preparations to harvesting, and thus have a better sense of cost -to-benefit ratios.

b) The Annual Agriculture Sample Survey (AASS) also by the National Bureau of Statistics (NBS). It is designed to be implemented annually, with the most recent conducted in (2016/17).

c) Agricultural Routine Data System (ARDS), by the Ministry of Agriculture (MoA) in collaboration with the President's Office Regional Administration and Local Government (PORALG). It is the most comprehensive by design and is conducted continuously during the Agricultural Year (October – September)).

d) AGSTAT for food security – Data and information on food security situation in the country and export and import permits- kept by Directorate of National Food Security (DNFS).

e) The Catalogue of varieties, as well as, the data on quantities of Certified and QDS seed produced each year - published by Tanzania Official Seed Certification Institute (TOSCI).

f) M-KILIMO database was considered potential for providing baseline and M&E data for Indicator 12.

g) FAOSTAT database, which is built through triangulation of data from the various national datasets described above, was also identified as an important source of data for setting the baseline and for continuous M&E.

11) Field work to obtain data for **Base Line Setting**, had to components:

a) Extraction of secondary data from the critical mass of the identified databases. This was done in the Capital City (Dodoma), as well as Morogoro. As described in the methodology in Chapter 2, the purpose was to identify sections of the target databases that provide data on the rice sector. This is because, all the identified databases, are not just for rice, but for agriculture sector in general. During this process, National Annual Reports by Tanzania Fertilizer Regulatory Authority (TFRA) was identified for indicator 13, and it was used as described in this Report. However, the database for Indicator 14 is still under development by DNFS and therefore the baseline will be set after the report is released.

b) Primary Data, obtained through:

i) Collection and validation of data for indicator 1, 2, 3, 5, 6, 7, 8, 10, 11, 12 and 13.

ii) Sample surveys in major rice production agroecology for verification of existing data collection processes that feeds into ARDS. Eight (8) districts were purposively selected and primary data was collected, in relation to indicators 7, 9, 11, 12 and 13.

iii) Market survey for collecting primary data for indicator 9 (i.e., % share of local rice in the market, as well as brands and prices of imported rice), was conducted as follows:
- Arusha City – ten supermarkets,
- Dodoma Capital City - three supermarkets,
- Dar-es-salaam - nineteen supermarkets
- Morogoro - five supermarkets, and
- Mbeya - three supermarkets.

1.3. This Report

12) The report is presented in three volumes and Volume 1 (the main part), presents:
    a) The processes and methodologies for data collection and assessment;
    b) All the collected data and information (*see Volume II Annex to the Report*);
    c) The review and analysis of the collected data and information; and
    d) Proposed baseline figure for each of the 13 indicators.

13) A description of the process and outcomes of the activities implemented to collect secondary data as well as primary data for setting the baseline of the 13 indicators of NRDS-II, as described in Table 1.

14) Chapter 2 presents the methodologies used for:
    a) Secondary data collection by extraction from the existing databases.
    b) Primary data collection from; (a) three main geographies in the production of Paddy in Tanzania, and (b) supermarkets in four (4) cities for assessing the competitiveness of locally produced rice against imports, in the national market.
    c) Guidance for using the same methodology in collection data during the M&E process.

15) Chapter 3 presents the findings of the review and analytical work, to delineate the respective secondary data that is adequate to set the baseline for relevant indicators. For nearly all indicators more than one source database is available, and the report presents comparative assessments used to select which value to use for the baseline.

16) Chapter 4 presents the conclusions, recommendations, proposed baseline figures.

17) Volume 2, is an Annex that presents tables of all the collected data and information.

18) Volume 3, presents a Manual that provides guidance for the process of monitoring and evaluating (M&E) of the implementation, outputs, outcomes and impact of NRDS-II.

2. Methodology Used in Collection of Data and Information

19) This section provides insights of the process of data collection and analysis. The analytical framework used in this study included triangulation and Data Quality Assessment to select the source and value for each indicator to be used in setting the baseline. A desk review of documents and databases, key informants' interviews (KIIs), observations, and focus group discussions were conducted to collect both primary and secondary data. List of persons consulted is provided in Annex 1 of Volume 2.

2.1 Collection of Secondary Data

20) This started with an in-depth review of the baseline values set by the NRDS-II (2018 – 2030). The main activity was a Focus Group Discussion with the NRDS Task Force members to elucidate the process that was followed to arrive at the baseline values contained in the document, for Indicator 1, 2, 3, 4, 5, 13 and 14.

2.1.1 Agricultural Routine Data System (ARDS)

21) The Custodian of Agricultural Routine Data System (ARDS) is the Division of Policy and Planning (DPP) in the MoA. The ARDS is a data collection and reporting system of Tanzania's agricultural sector (Figure 1). Data is collected by Village Agricultural Extension Officers (VAEOs) and aggregated at the ward level and submitted to the District Agricultural, Irrigation and Cooperative Officer (DAICO). The data is checked and entered into ARDS by a nominated Agriculture Officer at the District/Town Council level, and after the approval by the DAICO it is submitted to the Regional Secretariat. At regional secretariat level, data is compiled, checked, approved, and submitted to the National Level. Data collection is taking place continuously and uploaded monthly, quarterly, and annually.

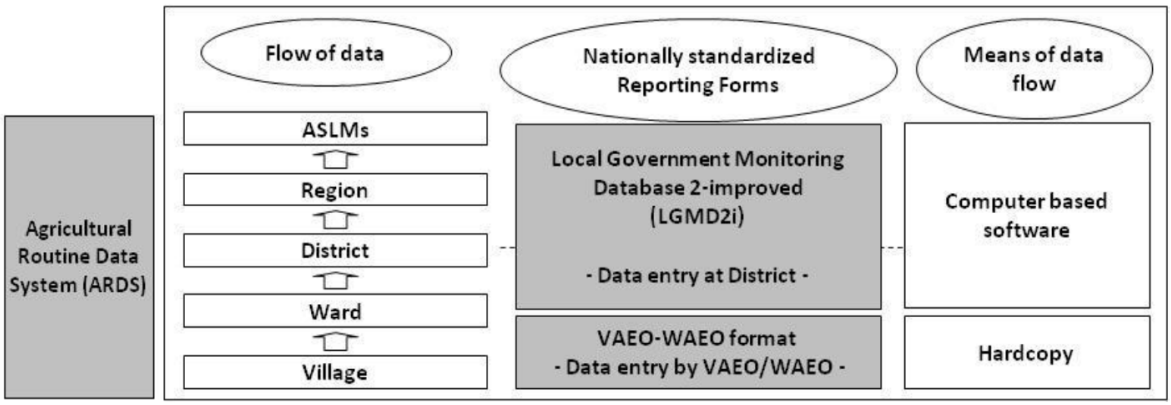


Figure 1: Flow of Data and Information in the Agricultural Routine Data System (ARDS).

22) Desk review and KIIs with officials of Monitoring and Evaluation section of DPP, were conducted. This involved interrogating ARDS system including tools used by Village Agricultural Extension Officers (VAEOs) and Ward Agricultural Extension Officers (WAEOs), as collectors of primary data.

23) It was found out that data for the following indicators is available from ARDS:

- Indicator 1: Quantity of paddy production (MT);
- Indicator 2: Area Planted with Paddy (Ha);
- Indicator 3: Paddy yield (MT/ha);
- Indicator 5: Area under irrigation (Ha); and
- Indicator 8: Level of mechanization in production.

24) The ARDS can also provide the baseline figures for indicator 12 – "the percentage of smallholder farmers' accessing technical training and services". This can be estimated by triangulating data on the number of farmers who received training on paddy production as captured in the ARDS, with total number of paddy farmers captured by NSCA (2019/2020).

25) Further, a review of ARDS using participatory SWOT analysis with key informants, provided insights presented in Table 2.

Table 2: SWOT analysis of ARDS in relation to capturing data for NRDS-II indicators

Strength	Weaknesses
i) Data is collected from village, ward and district level. ii) The MoA host secretariat for ARDS. iii) There is an ARDS desk officer for each district and region. iv) Similar tools are used across the country.	i) Inadequate technical capacity of WAEOs and VAEOs. ii) Inadequate facilities (particularly computers and printers). iii) Inadequate verification and quality assurance. iv) Complete lack of actual measurements.
Opportunity	**Challenge**
i) Developed by local experts from University of Dar es Salaam, which allow for easy of improvement. ii) Potential to enhance quality by linking/or becoming the *de-facto* Annual Agricultural Sample Survey (AASS) of NBS. iii) Several other databased such as (Irrigation database, M-Kilimo; Seed Catalogue, etc.) can be integrated with ARDS to enhance cost effectiveness. iv) Integrating national monitoring systems of different MDAs.	i) Many farmers do not keep records, and often the data they give to officers, is guess work. ii) Delays in primary data collection and entry at LGA level due to limited number of staff and facilities. iii) Inadequate capacity of some LGAs to collect data. iv) Limited budget and prioritization, v) Not linked with other M&E systems of other MDAs. vi) Challenging internet connectivity in rural districts.

26) Improvements recommended by ARDS users across all levels, included: increased budget allocation for ARDS operations, continuous capacity building of extension staff, use of tablets for data entry directly to ARDS at ward level, more follow up and support from Ministry of Agriculture, ownership of ARDS by LGAs, and use of ICT (e.g., GPS) to do sample measurements. The recently on-going initiative by the Government to improve extension service delivery through distribution of motorcycles and tablets to extension officers, among others, are expected to contribute to improvement of ARDS processes and quality of data.

2.1.2 Data from the National Bureau of Statistics

27) The process of evaluating and collecting the data available from the National Bureau of Statistics (NBS), included a meeting with the Manager of Agriculture Statistics at NBS, at the NBS HQ in Dodoma. The meeting was also attended by an officer from the M&E Unit of MoA. This was followed-up with the review of reports emanating from surveys and census of agriculture as implemented and published by the NBS.

28) NBS (*https://www.nbs.go.tz*) provides statistics relevant to the agricultural sector in general and the rice sub-sector in particular, under its Agriculture Statistics Strategic Plan (ASSP), which was established as a result of Global Initiatives to Improve Agricultural and Rural Statistics (GIIARS). This led to the establishment and/or strengthening of the following:
   a) National Sample Census of Agriculture (NSCA) conducted every 10 years to generate relevant and reliable agricultural statistics.
   b) Annual Agricultural Sample Survey (AASS), which is conducted to cover the agricultural year (1st October to 30th September).

c) Household Budget Survey (HBS) which is conducted over the financial year.
d) Support to district level data using Small Area Estimation (SAE).
e) Providing Reliable Crop Forecasting Data (CFA).

29) Only the NSCA and AASS, were accessed and used for collection of secondary data for the purpose of setting a baseline for the NRDS-II. The main characteristics of these two databases, are as described below.

30) The NSCA was specifically designed to provide independent set of data for the M&E of the results, outcomes and impacts of the Agriculture Sector Development Program Phase II (ASDP-II) – under which NRDS-II falls. The fact that the most recent NSCA was conducted during the 2019-2020 (Agricultural Year), makes it stronger in relevance/applicability in the setting of the baseline for NRDS-II.

31) Farmers questionnaire is the main instrument of NSCA. The resulting report as per summary of its content and as summarized in Table 3, captures and reports data relevant to all indicators of NRDS-II, except indicator 14.

Table 3: NSCA's Coverage of Indicators of NRDS-II, in the 2019/20 Report

Sections of the Report	Tables of the Report	Indicators of NRDS-II
3.1 Crop Production 3.1.1 Cereals Crop Production 3.1.1.2 Paddy	**Table 3.1**: Total Planted Area, Harvested Area, Quantity Harvested and Yield of Cereal Crops **Table 6.23:** Number and Percentage of Households Reporting Status of Food Satisfaction in the Last Twelve Months	**Indicator 1:** Quantity (million MT) of paddy production
		Indicator 2: Area (million ha) under cultivation with paddy
		Indicator 3: Yield (MT/Ha) of paddy
		Indicator 4: Self-sufficiency rate (%)
3.2 Agro-Processing 3.2.1 Households Involved in Agro-processing 3.2.2 Quantity of Crop Products 3.2.3 Major Outlets for Selling Agro-processed Products		**Indicator 7:** Level of industrial milling capacity (%)
		Indicator 9: Share of local rice in the local market (%)
3.3 Irrigation 3.3.1 Area Planted under Irrigation 3.3.2 Main Crops Irrigated 3.3.2.1 Cereals	**Table 3.20**: Area under Irrigation During Short + Long Rainy Seasons	**Indicator 5:** Area under irrigation (ha) for Paddy Production
3.4.1 Seed Use 3.4.1.1 Household Using Seeds 3.4.1.2 Area Applied with Seeds	**Table 3.22:** Number of Households Reported to Use Improved Seed **Table 3.23:** Area Planted by Type of Seed Used	**Indicator 6**: Quantity of Seeds (certified and QDS) of Resilient Varieties (MT)
		Indicator 10: Quantity of Seed (certified and QDS) of high-yielding varieties (MT)
3.4.2 Fertilizer Use 3.4.2.1 Households Using Fertilizer 3.4.2.2 Area Applied with Fertilizer	**Table 3.24:** Number of HHs Reported to Use Fertilizer and Type of Fertilizers **Table 3.25:** Area Treated with Fertilizer and Type of Fertilizers	**Indicator 13:** Fertilizer adoption rate (% of rice farmers)
3.5 Crop Extension Services 3.5.1 Access to Crop Extension Services 3.5.2 Source of Extension Services 3.5.3 Extension Message Practices 3.6 Agriculture Mechanization 3.6.2 Use of Tractors and DAP		**Indicator 12:** Smallholder farmers' accessibility to technical training and services (%) **Indicator 8:** Level of mechanization in production

Sections of the Report	Tables of the Report	Indicators of NRDS-II
5.1 Agricultural Households Reported to Borrow Money 5.2.1 Source of Credits 5.2.2 Uses of Credits 5.2.3 Value of Credits 5.2.4 Main Reason for Not Borrowing Credit	**Table 5.1:** Number and Percentage of HHs that Borrowed for Agric Activities **Table 5.2:** Number of Agricultural HHs that Received Second Credit **Table 5.3** Percentage of Agricultural HHs Reported the Use of Credit **Table 5.4:** Value and Percentage of Credits and Repayments	**Indicator 11:** Smallholder farmers' accessibility to financial services (%)

32) The most important attributes of the NSCA, are:
   a) Being based on the consistently used National Master Sample (NMS) as a national framework for conducting household-based surveys in the country). It is therefore reported that *the 2019/20 NSCA adopted a two-stage design with census enumeration areas as Primary Sampling Units (PSUs) and households as second-stage units*, leading to a systematic *selection of agricultural farming households from the selected Enumeration Areas (EAs) for data collection. The data was collected from a sample of 33,808 smallholder farmers, of which 32,008 were from Mainland Tanzania and 1,800 from Tanzania Zanzibar. Data was also collected from 1,093 large scale farms (1,018 were from Mainland Tanzania and 75 in Tanzania Zanzibar) on a complete enumeration basis* (NBS, 2021). This makes it strong in setting the baseline of NRDS-II.
   b) The guarantee that it shall be replicated in another ten years (i.e., in 2029/30), in the same way. This makes it most powerful in measuring the advances made by the rice sector over the Ten Years of Implementation of NRDS-II.

33) However, it has its limitations too:
   a) First, is the problem similar to that faced by ARDS, the lack of sampled measurements to verify the recall and estimates obtained from the sampled respondents.
   b) It is not implemented annually, and thus it cannot be used for annual M&E.

34) Although by name, Annual Agricultural Sample Survey (AASS) is supposed to be done annually, it has only been done twice so far, for the Agricultural years of 2014/15 and 2016/17. With respect to methodology, it does not significantly differ from the NSCA, in that *the only method used for data collection was face-to-face interview by using the structured questionnaire. Fieldwork was monitored through a hierarchical system of supervisors that began with the National Team, followed by the regional supervisors and enumeration team supervisors. The National Team included two senior supervisors who were responsible for overall guidance of field operations and responding towards queries raised outside the scope of subordinates* (NBS, 2018).

35) Comparative assessment of data from the AASS, compared with other databases (see Chapter 3), shows that the AASS is very weak in its design, execution, coverage of the indicators of NRDS-II, as well as in its regularity, to be of significant use in setting the baseline of NRDS-II, let alone its M&E. However, as the AASS is very similar to the ARDS, there is an opportunity of combining the two to create a really powerful system for continuous monitoring of the Agricultural Sector in the country, as well as NRDS-II.

2.1.3 Data from the Division of National Food Security (DNFS)

The Division of National Food Security (DNFS) uses 10 different key data collection tools for Crop Monitoring and Early Warning system (CMEW) to record, validate, and prepare data for retrieval and monitoring of food crops production situation in the country. The data is produced annually giving preliminary and final forecast reports and trigger vulnerability assessment that help the Ministry to detect hotspots likely to face food shortages at district and household level. The main instruments consist of forms filled manually in the field to

collect data on weekly, bi-weekly, and monthly basis. The forms are also used during the preliminary and final food crop production forecast surveys.

36) Data collection is done in close collaboration with Tanzania Meteorological Authority (TMA). Assumptions made on data collected and computed, include the following:
   a) Harvested areas are equivalent to planted areas (*which is not always correct*),
   b) Weather conditions are favorable throughout the season, and
   c) The sample villages represent all villages in the country.

37) The data collected is analyzed and conversions are made to get the following information:
   a) Production figures: At National and Regional levels.
   b) Food Requirement for the year based on population (mid-year population), food consumption requirement, and non-food requirements. Non-food requirements include seeds, animal feeds, traded produce and crop losses that are a certain percentage of food crops produced based on the factor of estimated post-harvest losses.
   c) Food Surplus/Shortage is simply the difference between the estimated production minus estimated consumption.
   d) The Self Sufficiency Ratio (SSR) is derived by comparing production and requirement whereby: **0 – 99** percent represents food shortages; **100 - 119** percent denotes food self-sufficient while **120** percent and above, indicates food surplus.

38) The following limitations were highlighted on the methods used to collect data by DNFS:
   a) Data collected are estimation especially on area cultivated and expected yield
   b) Outdated values of the quantity of non-food consumption requirement
   c) Inadequate weather information especially from representative sampled villages.

39) To strengthen the quality of food self-sufficiency data, DNFS survey have been complemented by the sample surveys using FSQ1 to align data collected by DNFS and the data collected by NBS, based on sampled villages to address subjectivity problems.

2.1.4 TOSCI Database

40) The process of evaluating and collecting the data available from the Tanzania Official Seed Certification Institute (TOSCI) included consultation with the CEO followed up by physical meeting with management and technical staff, at the TOSCI HQ in Morogoro.

41) TOSCI is a semi-independent government institution under the Ministry of Agriculture (MOA), with its own Board of Directors and a Chief Executive Officer. It is responsible for:
   a) Verification of new varieties of crops for official release and then maintains a Catalogue of all approved varieties. The structure of the catalogue is as illustrated (for Paddy) in Table 4 which is made of columns for each variety. Only the 1st and last columns of entries is presented.
   b) Certification of all seed produced in the country, from the different stages of breeding up to Certification as well as the production of Quality Certified Seed (QDS) as illustrated in Table 5.
   c) The certification is enabled by its mandate as sole registrar and inspector of seed farms, seed distributors and seed dealers, in the country.
   d) Issuing all permits for export, import and/or movement of seed in the country.

42) The TOSCI database was triangulated with research data to fully distinguish the seed with respect to resiliency and high-yielding. To achieve this, field data collection was also implemented at TARI Ifakara, to consult with the Centre Manager and the leading Rice Breeders, as described in Box 1. With respect to baseline setting, during the baseline year of 2019/20:

a) Out of the twenty-one (21) varieties in the catalogue, seed was produced and supplied locally as certified and QDS, only for the varieties TXD 306 (SARO 5), TXD 88 and Komboka.
b) ARIZE GOLD seed were imported, certified and distributed.
c) The outcome of this process with respect to baseline figures, is presented in Table 5.

Table 4: Extract from the TOSCI Catalogue on Released Rice Varieties in Tanzania

S/No	**1** (the oldest variety in the catalogue)	. . .	**21** (The newest variety in the catalogue)
Variety Name	Supa		TARI- RIC1
Year of Release	Before 1950's		2020
Owner or Maintainers of the Variety	ARI KATRIN		Tanzania Agricultural Research Institute (TARI)
Altitude Range for Optimal Production	0-400 masl		100 - 1,200 masl
Recommended Geographies	Morogoro, Pwani, Mtwara, Lindi		
Grain Yield MT/Ha	1.5 - 3.5		
Distinct Characteristics	• Leaf blade: Pubescent • Leaf angle: Erect • Auricle colour: Pale Green • Days to heading: 93- 100 • Culm angle: Erect • Flagel leaf angle: Erect • Panicle type: Intermediate • Second branching: Light • Awn presence: Absent • Grain shape: Slender • Seed coat color: White		
Special Attributes	Moderately resistant to rice yellow mottle virus and sheath rot		• High grain yield potential and stability in its areas of adaptation • Aromatic with good cooking quality (stays soft after cooling) • Good grain quality (translucent and long)

Box 1: Notes on Meeting with Leadership of TARI Ifakara

Participants:
i) Dr. Atugonza Bilaro (atubilaro@yahoo.com) – Centre Director
ii) Dr. Theodere Kessy (kessytt@yahoo.co.uk) – Senior Rice Breeder
iii) Prof. Nuhu Hatibu – Consultant
iv) Ms. Getrude Sombe (Economist) – the NRDS TF

Key Aspects of Discussion and conclusions:
a) Categorization of the Varieties list from TOSCI, into the following two categories:
   i) Indicator 6: Resilient Varieties: locally preferred varieties with resilient characteristics (in relation to biotic and abiotic stresses)
   ii) Indicator 10: High-yielding Varieties (Locally preferred varieties with high-yielding attributes)
b) Clarification on:
   i) The seed classes from the presented data whether it is Pre-basic, Basic or Certified Seed or QDS (quality Declared seed);
   ii) The Unit of measure whether the data is in kg or MTs;
   iii) TXD 306 and SARO 5, is the same Variety so need not be reported twice.
   iv) Exact data for different seasons, and agreeing on the amount for 2019/20.

Table 5: Extract from the TOSCI Catalogue - Rice Seed Quantities during 2019/20

Variety	CERTIFIED (MT)	QDS (MT)	Total (MT)	
			Resilient	High Yielding
TXD 306 (SARO 5)	114.5	250.3	364.8	364.8
TXD 88	28.7		28.7	28.7
Komboka		4.4	4.4	4.4
ARIZE GOLD (imported)	5.5	-	5.5	0
Total (2019/20)	**143.2**	**254.7**	**397.8**	**359.3**

43) The ARDS also maintains data on "seed" sold locally, and the data set is as summarized in Table 6. The ARDS includes data of quantity of seeds used by farmers which are disaggregated by varieties. However, the key informants' interview with WAEOs and district officials confirmed that ARDS data on the quantity of seeds used includes seeds from informal sources including good number of previous producers QDS, who are no longer inspected by TOSCI but are still trusted as sources of quality seeds by their fellow farmers. Therefore:

a) TOSCI was requested to comment on the numbers reported by the ARDS, and the reply was "*There is no clear spot to point out the data difference between the two sources (TOSCI and ARDS). However, we advise you dig more in the ARDS data as it crosses in long pipeline from Village Agricultural Extension Officers (VAEOs) to Regional Agricultural Advisers (RAAs) before being approved by the Ministry of Agriculture. For TOSCI …the TOSCI Officers collect data directly from the source and fill in the database. So, at TOSCI, we are quite sure with the figure provided (by us TOSCI)*"

b) It was therefore, concluded that the seed data entries in the ARDS, cannot at the moment be counted as reliable and thus it is recommended to use TOSCI data. However, it is proposed that TOSCI should investigate this situation and take remedial measures.

Table 6: Extract from ARDS Seed Quantities (MT/year)

Variety	Resilience attributes	Yield potentials (MT/ha)	ARDS (MT)
Dakawa	Resistant to lodging	Low	14.91
IR 22	Resistant to bacterial blight	High	0.65
IR 54	to blight and sheath rot	Low	26.80
Kalalu	Yellow Mottle Virus and Rice blast	Low	0.94
KATRIN	-	High	0.84
Mwangaza	Resistant to Rice Yellow Mottle virus (RYMV) and rice blast	Low	74.36
NERICA 1	Drought resistant	Low	42.17
NERICA 2	Drought resistant	Low	1.31
NERICA 4	Drought resistant	Low	-
NERICA 7	Drought resistant, early maturity (95-100 days)	low	0.08
TXD 306 (SARO 5)	Early maturity and disease resistant	High	1,507.14
TXD 85	Moderately resistant to sheath rot, rice blast and RYMV	Low	37.47
TXD 88	Moderately resistant to sheath rot, rice blast and RYMV	High	28.30
Komboka	Early maturity (100-110days), Resistant to RYMV, bacterial Leaf spot and Bacterial leaf blast	High	
Arize gold (imported)	Resistant to Leaf Blight	Low	
Total (MT)	**All varieties**		**1,734.96**
Total-Indicator 6	**Resilient varieties**		**1,734.13**
Total-Indicator 10	**High yielding**	**>6MT/Ha**	**1,600.36**

2.1.5 M-KILIMO Database

44) The Mobile Kilimo (*farming*) (M-Kilimo) was established in 2020 and is based at the Division of Training, Extension and Research (DTER) of the MoA. The system enables registration of farmers to allow them to access on-line extension services and market information through their mobile phones. By 27th June 2021, M-Kilimo had registered 5,881,015 farmers. Figure 2 shows the dashboard display of M-Kilimo highlighting the data that is available.

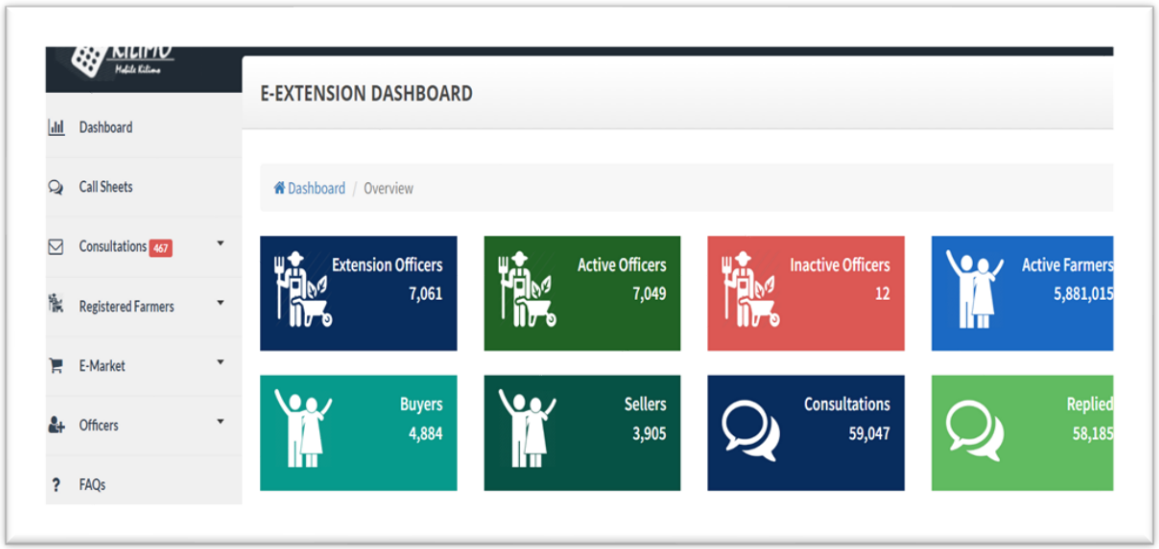


Figure 2: M-Kilimo online interface

45) Since M-Kilimo does not disaggregate users and queries by crops, M-Kilimo could not be used to establish the baseline for indicator 12 as it was initially proposed. The summary of SWOT analysis of M-Kilimo with key informants is presented in Table 7.

Table 7: SWOT analysis for M-Kilimo in relation to data for NRDS-II indicators

Strength	**Weakness**
Registered more than 5 million farmers and 6,704 extensions officers. Enables mobile extension and the building of a catalogue of Frequently Asked Questions (FAQs) and answers provided. Monitor extension service delivery.	Very new and thus has no data for baseline setting. No categorization of services by crops therefore no information on paddy specific extension service delivery.
Opportunity	**Challenge**
Government funded initiative. On-going improvement of the system to provide crop specific advice. Facilitate monitoring extension delivery by LGA officers. Linking the system with ARDS system.	Limited budget allocation at LGA level to support extension officers with facilities and other charges.

2.1.6 TFRA: National Annual Reports of Fertilizer Distribution

46) The Tanzania Fertilizer Regulatory Authority (TFRA) is a corporate body mandated to regulate, record and report the manufacturing, importation, marketing, and use of fertilizer in the country. These records were found to be adequate for setting the baselined as well as M&E of indicator 13.

47) However, given the nature of the data, available from TFRA, it is proposed that indicator 13 of NRDS-II, on fertilizer adoption rate (% of rice farmers) be changed to quantity of fertilizer used in paddy production (kg/ha).

2.1.7 National Irrigation Database (NID) of NIRC and NIMP-II

48) At the time of this assignment of developing the baseline for NRDS-II, the National Irrigation Database (NID), was not yet functioning. It is reported on chapter 6 of the National Irrigation Master Plan (NIMP-II), that very good initiatives were implemented since 2002 (during the development of NIMP-I), to establish a strong system for data collection that will feed into NID. These included:
   a) Updating data on irrigation schemes, using:
      i) GPS-based survey of schemes by district irrigation staff, on the basis of the 2016 scheme list;
      ii) Questionnaire Surveys for the same districts and schemes; and
      iii) Mapping of a sample of schemes.
   b) Training of Trainers (the Zonal database officers), who were then expected to train the district staff.

49) Unfortunately, the NID is yet to be completed, although the efforts of its development yielded good data on number of irrigation schemes in the country. The conclusion was that, as of March 2018, there were 2,947 irrigation schemes in the country.

50) To support the M&E of Irrigation in general and irrigation of paddy, in particular, it is recommended that the NID should be completed and integrated with ARDS to enable a better assessment of irrigation growth and performance. The investment in GPS facilities already available at District Irrigation Offices, should be expanded to support the entire ARDS process to ensure accurate data of area cultivated, area irrigated per crop, and area harvested.

2.2 Collection of Primary Data

2.2.1 Sampling and data collection

51) Field survey and primary data collection was conducted using multi-stage purposive, area, and snowball sampling.

   a) Eight (8) districts were purposively selected from the three major ecologies producing rice in Tanzania, i.e., Southern Highlands, Eastern and the Lake zone. These included the leading district for production of rice in each zone. More districts were chosen in Morogoro regions as it provides the largest numbers of districts in the top 20 rice producing districts in the country. The selected districts were:
      i) Mbarali, in Mbeya Region.
      ii) Kyela, also in Mbeya Region
      iii) Ifakara TC (Kilombero district), in Morogoro Region
      iv) Morogoro, in Morogoro Region
      v) Mvomero, also in Morogoro Region.
      vi) Nzega, in Tabora Region.
      vii) Maswa, in Simiyu Region.
      viii) Shinyanga, in Shinyanga Region.

   b) Five (5) cities and/or municipalities were purposively selected for primary data collection with respect to indicator 9 (share of local rice in the market). The selected were:

i) Arusha City, selected because of its importance in tourism;
ii) Dar es Salaam City, selected because it is the largest city with the main port through which most of rice importation is done;
iii) Dodoma City, selected because it is fast growing as a new capital city of the country;
iv) Mbeya City, selected to represent urban areas near leading rice producing areas; and
v) Morogoro Municipality, also selected to represent urban areas near leading rice producing areas

c) The aim of the survey was to target all supermarkets operational in the target cities. The approach included the following steps:
   i) Planning meeting with the Regional and/or City head of Trade Department.
   ii) After these, a trade officer was assigned the responsibility of accompanying the consultants in conducting the survey using the questionnaire illustrated in Annex 3 of Volume 2, which also provide the names and contact persons of supermarkets surveyed.

52) The following activities were undertaken to validate the processes of data collection from village levels and feeding upwards to the district, regional and then national levels:

a) Working with statisticians at district levels on (i) the processes of the ARDS, (ii) review the data collection processes, (iii) cross checking tools used for ARDS data collection, and (iv) use of data collected at source and discuss areas for improvement especially for NRDS-II indicators.

b) To conduct KIIs with rice millers to collect data for Indicator 7: Level of industrial milling capacity (%);

c) To conduct KIIs with managers/supervisors of supermarkets to collect data for Indicator 9: Share of local rice in the market (%).

d) To conduct Focus Group Interviews with Irrigation Organization (IOs) leaders to collect data for Indicator 11 (Smallholder farmers' access to financial services (%)) and indicator 12 (Smallholder farmers' accessibility to technical training and services (%)).

53) The main tools that were used for data collection for KIIs and Focus Group Interviews (FGI) included structured and unstructured questionnaires and physical observations especially for milling machines. The study targeted Regional Agricultural Advisors (RAAs); Regional and District Statisticians, particularly those who are directly engaged in the ARDS; DAICOs, TAICOs; VAEOs and WAEOs; Millers; leaders of IOs and managers of supermarkets.

54) The ARDS booklet of guidelines for data collection was reviewed. A summary for data collection process for each NRDS indicator is provided on Table 8. The team further assessed relations between the processes of ARDS and those of the Annual Agricultural Sample Surveys (AASS) and National Sample Census of Agriculture (NSCA), conducted by NBS. The purpose was to understand the level of involvement of the District Councils in data collection and the utilization of data collected at the district level.

55) Furthermore, the team discussed M-Kilimo system with the DAICOs office to assess how they are involved in registration of farmers in the system and their participation in providing response in questions asked by farmers via the platform.

Table 8: Collection Process for Primary Data

Indicators	Process	Remarks
Indicator 1: Quantity of paddy production (mil. MT)	Village Extension Officer samples 10-20 farmers' fields during harvesting, measures the quantity of paddy harvested and extrapolate the area as registered in the village farmer register and sends to the WAEOs who aggregates the data and submits the forms physically to the District Statistics Officers who enter the data in the ARDS.	Each village has a Farmer Register by name, crop grown and total area for each crop. VAEOs and WAEOs follow the guidelines for data collection provided by the MoA.
Indicator 2: Total area planted (mil. Ha)	The VAEOs surveys the area planted and extrapolate the total area harvested based on the village farmer register.	All data is based on estimates, as no measurements are carried out.
Indicator 3: Yield per unit area (MT/Ha	Calculated based on the total production and total area planted.	
Indicator 5: Area under irrigation (Ha)	Area under improved irrigated schemes is well captured; other areas are estimates.	Data also available at NIRC, but not disaggregated by crop.
Indicator 7: Level of industrial milling capacity (%)	Number of milling machines counted and captured by VAEOs when filling in monthly, quarterly, and annual forms.	Milling machines are not segregated by size/capacity.
Indicator 8: Level of mechanization in production	Number of tractors, power tillers and combine harvesters counted and recorded by VAEOs when filling in monthly, quarterly, and annual forms	Data of machines owned by farmers in the districts are captured.
Indicator 12: Smallholder farmers' accessibility to technical training and services (%)	Number of farmers trained is reported by VAEOs in monthly, quarterly, and annual forms	Data is available for extension and trainings and is reported quarterly in ARDS forms.
Indicator 13: Fertilizer adoption rate (% of rice farmers)	Data available for type and quantity of the fertilizer received and utilized in the districts.	TFRA is collecting data at district level on fertilizers distributed in the area.

56) Key Informant Interviews were conducted with managers or supervisors to collect primary data for setting the baseline for indicator 7 (*Level of industrial milling capacity (%)*). A total of 173 milling enterprises were surveyed in Morogoro, Shinyanga, Simiyu and Tabora regions. District agricultural officers assisted in the collection of data. Snowball sampling procedure was used under the guidance of the ward and village extension officer in the respective ward moving from one station to the other. Details of the machines evaluated is provided in Annex 5 of Volume 2.

57) Eight irrigation schemes were surveyed in Morogoro DC, Mvomero DC, Ifakara TC, Shinyanga DC, Maswa DC and Nzega TC. Focus Group Interviews were held with leaders and members of Irrigators Organizations to collect primary data for setting the baseline for Indicator 11 (*smallholder farmers' accessibility to financial services (%)*); and Indicator 12 (*Smallholder farmers' accessibility to technical training and services (%)*).

58) Purposeful sampling of the schemes was used based on proximity to major roads as the time was limited in carrying out this survey. A structured questionnaire was used in data collection and it included extra questions meant to capture information on the use of fertilizers in paddy production for Indicator 13 (Fertilizer adoption rate), and Indicator 8 (level of mechanization).

~~59)~~ Market survey for collecting primary data for indicator 9 (i.e., % share of local rice in the market) used multistage sampling which includes purposive selection of major cities/towns where data was collected using snowball sampling. Data collection involved three tools namely: structured and unstructured questionnaires; focus group discussions; and key

informant interviews. A total of 21 supermarkets were surveyed in Arusha city (10), Dar-es-Salaam (19), Dodoma city (3), Mbeya city (3) and Morogoro Municipal (5).

2.2.2 Data processing and presentation

60) Descriptive analysis methods have been used in this study. Microsoft Excel was used in data handling, manipulation, and analysis. Triangulations was done to establish baseline figures because for some indicators, several databases (ARDS, NSCA, AASS, AGSTAT, and FAOSTAT), provided data for several indicators.

2.3 Guidance for Data Collection during for the M&E Process

61) This subsection elaborates the process and steps followed, and lessons learned in obtaining the data used to set the baseline values. Then, the section provides guidance on how the same process and steps should be used in obtaining data for the M&E process. Extra guidance is provided in the M&E Manual.

2.3.1 Extraction of secondary data

62) The previous two sections of this chapter have already presented in details the process and methodology used to extract data for purpose of setting the baseline. Therefore, this subsection only presents aspects that need improvement during the M&E process.

63) The Agricultural Routine Data System (ARDS), is capable of providing regular data for M&E of most of the indicators, because data is continuously collected and uploaded monthly, quarterly, and annually. The only limitation is quality assurance as presented in Appendix 5. Therefore, there is needed intervention from NRDS-II TF, to ensure that all weaknesses in data collection are removed.

64) Annual Agricultural Sample Survey (AASS) was found to be of limited quality (see Appendix 5), but since it is executed by the NBS in collaboration with the MoA, there is really good opportunity for integrating it with the ARDS, to produce quality data for M&E of annual delivery on the indicators of NRDS-II.

65) Collection of secondary data from ARDS database will be done as secondary data for indicator 12. The data will also be triangulated with that of M-Kilimo database after the portal is reviewed to disaggregate data on rice farmers.

66) Data from TOSCI, is required for indicators 6 and 10, and has two parts:

(a) **The Variety Catalogue**, which contains, regularly updated Information on Released Crop Varieties in Tanzania. It does not seem to be a database but can be downloaded from the TOSCI website (https://www.tosci.go.tz). As illustrated on Table 4 of this report, the catalogue contains all information need to distinguish rice varieties by resilience (Indicator 6 of NRDS-II); and by yield levels (Indicator 10 of NRDS-II). Therefore, the collection of data is simple:
   i) First step is to obtain information from TOSCI regarding the varieties, for which Certified and/or QDS Seed was produced in the year of monitoring (see (b) below);
   ii) Use the catalogue to determine which of those varieties meet the resilience and high yielding characteristics. Note that, more often than not, most modern varieties are bred to meet both requirements; and then
   iii) Hold discussions with senior rice breeders, especially in TARI-Ifakara, to obtain more insights on the characteristics of the rice varieties.

(b) Annual Reports of quantities of seed produced as **Certified,** or approved as Quality Declared Seed (**QDS**), are produced by TOSCI. However, this data is not yet available in a publicly accessible database, but rather it is stored in Excel Files at the TOSCI up-country and HQ offices.

Therefore, accessing this data, required physical visit to the TOSCI HQs in Morogoro to get access. The officials of TOSCI provided this data very efficiently and therefore accessing this data for M&E of NRDS-II should not be a problem. It is suggested that after extraction of data from TOSCI records, the Table presented in **Appendix 1** should be used to establish a summary that can be used for NRDS-II M&E.

67) Tanzania Fertilizer Regulatory Authority (TFRA) provides data on the amount fertilizers used in each district per year for each type of fertilizer. For M&E of indicator 13 (quantity of fertilizer used in paddy production (Kg/Ha)), two variables are used: total fertilizer used in paddy production, and the area planted with paddy in that particular year.

a) The area under paddy production is obtained from ARDS as describe in section 2.1.1 of this report. The amount (Kg) of fertilizers used for paddy production per year, need to be calculated on the basis of the following assumptions:
   i) That, out of the total fertilizer used in crop production in Tanzania (AFAP, 2019), about:
      - 43% is utilized for maize production;
      - 16% in tobacco; and
      - 10% in rice production.
   ii) Furthermore, the NRDS-II documents, reports that DAP and UREA are the inorganic fertilizers that are widely used in paddy production (Section 5.2 pg 25 of the document).
   iii) The primary data collected during the setting of the baseline (Annex 6a & 6b; Volume 2), found out that paddy production accounted for about 20% of the total DAP & UREA fertilizers used in crop production in Tanzania in the 2020/21 cropping year.

b) Therefore, the quantity of fertilizer used in paddy production is obtained by dividing the quantity of fertilizer used in paddy production (20% of the DAP & UREA utilized in crop production, as reported by TFRA), by the area planted with paddy (as reported by ARDS and AASS). While doing this, the % of amount of fertilizer used in paddy should be reviewed frequently.

68) AGSTAT - The Self-Sufficiency Ratio (SSR) is derived by comparing production and requirement from the data collected, compiled, and computed by DNFS to understand the trends in food SSR. The NRDS TF will extract data from AGSTAT report produced annually by Division of National Food Security (DNFS) to determine the rice self-sufficiency rate for that particular year and the trends of SSR for rice in the country.

69) Division of Policy and Planning: Secondary data for assessing smallholder farmers' accessibility to financial services will be collected from the Division of Policy and Planning. The Division collects and compiles data from financial institutions including commercial banks and micro-finance institutions such as AMCOS, SACCOS, VICOBA, and VSLAs. The data from Tanzania Cooperative Development Commission (TCDC) could be used to establish the status of the SHFs who have accessed finances.

2.3.2 Primary Data Collection

70) Section 2.2 of this report describes the methodology used in the collection of primary data for setting the baseline. During the M&E process, primary data collection will be required for indicators 7, 9, 11 and 12. Therefore, this subsection only presents aspects that need improvement for primary data required for the M&E of these indicators.

71) It is proposed that surveys may be conducted face to face or electronically by telephone or by mail. Electronically administered surveys have a wide reach hence the sample size may be large enough to be more representative and they are relatively cheap to administer. DAICOs should be involved in collection of this data to manage the readiness to respond to the survey by respondents.

72) Indicator 7 - Level of Industrial Milling Capacity (%)

a) It is recommended to conduct field surveys to obtain data for monitoring indicator 7, until when improvements are made on the ARDS data Form entry 3(e) to disaggregate the milling machines according to their installed capacity to capture the % of milling machines with the capacity of 2 MT/hr and above.

b) In conducting field surveys, multistage purposeful sampling should be used to select districts among the 64 major rice producing districts in the country. Then the method of Key Informants (*managers and supervisors*) Interviews, should be used to collect data using a structured questionnaire complimented with physical observations/assessment of the milling machines (Appendix 2). Then, random or snowball sampling procedure should be used to select the interviewees under the guidance of ward and village extension officers in the respective villages and wards.

c) During the baseline setting, a field survey was undertaken in Morogoro region (Morogoro Municipality, Morogoro District Council (DC), Mvomero DC and Ifakara Town Council); Shinyanga region (Shinyanga DC); Simiyu region (Maswa DC) and Tabora region (Tabora Municipal Council and Nzega DC). These regions were selected because they are among the leading rice producing regions in the country. Therefore, these districts should be maintained in the M&E sample, which may also include other districts as it may be determined. A sample questionnaire is illustrated in Appendix 2.

73) Indicator 9: Share of Local Rice in the Market:

a) Data for this indicator is not being collected by any institution, so as described in paragraph 57 of this report, primary data was used in setting the baseline and it will be necessary for M&E.

b) Purposeful selection of supermarkets should be done to take into consideration cities/towns with large populations and high purchasing power, and those close to leading rice producing areas. These cities/towns include Arusha, Dar es Salaam, Dodoma, Mbeya and Morogoro.

c) The methodology will involve working with City and Municipal Councils – through the Department responsible for Trade. NRDS TF should identify enumerators and train them, and the structured questionnaire will be used for data collection (see Appendix 3).

74) Indicator 11: Smallholder farmers' accessibility to financial services (%). NRDS TF should collect primary data from selected schemes in the 64 leading districts in rice production (Appendix 4) to triangulate data from DPP and TCDC. Key Informant interviews (KIIs) should be used to collect data from the leaders of Irrigators Organizations (IOs) at scheme level who will provide basic data on number of SHFs who accessed finance in each growing season. The structured questionnaire used is presented (see Appendix 4).

75) Indicator 12: Smallholder farmers' accessibility to technical training and extension services (%). Primary data using sample survey should be done every year to collect data from selected schemes in 64 major rice growing districts (Appendix 4).to validate the data obtained in ARDS. KIIs with leaders of Irrigators Organizations (IOs) should be used to collect data at the scheme level where they will provide basic data on number of SHFs that have accessed training and extension services in each growing season. The structured questionnaire used is presented in (see Appendix 4).

3. Review and Analysis of Collected Data and Setting of Baselines

76) Data Quality Assessment (***see Appendix 5***) was done on eight potential data sources; that is the ARDS, NSCA, AGSTAT, FAOSTAT, AASS, BDB, TOSCI, and TFRA . The assessment was made on validity, timeliness, completeness, accuracy, relevance and consistence. Six data sources, namely, NSCA, AGSTAT, FAOSTAT, TOSCI, TFRA and ARDS, were ranked highly as their methodology for data collection was well documented with detailed guidelines and the data was collected at regular specified intervals. Data collection for NSCA and AGSTAT includes surveys of representative samples, and the data, analyses and findings are published as official government databases. The NSCA is conducted every 10 years, with surveys covering both seasons. The AGSTAT for Food Security Report is produced annually with a preliminary report being produced in mid-season during the cropping calendar. ARDS data is collected in all villages and is aggregated at ward, district, regional and national level on monthly, quarterly and annual basis.

77) However, most of the data sources lack actual measurements of target variables except the irrigation, seed and fertilizer databases. Thus, no single data source may be used for setting the baseline for all 14 indicators of ARDS-II. Therefore, for each indicator, potential sources of data are compared and contrasted in this chapter, leading to recommendation on which data source should be used to set the baseline value. In comparing the databases the most recent publication for each was used.

3.1 Indicator 1: Quantity of Paddy Production (MT)

78) The quantity of paddy production has been reported in several sources including AGSTAT BDB; AASS; NSCA; and FAOSTAT. Furthermore, raw data on this indicator are found in ARDS. A comparison of values from these databases, on quantity of paddy production, is presented in Figure 3.

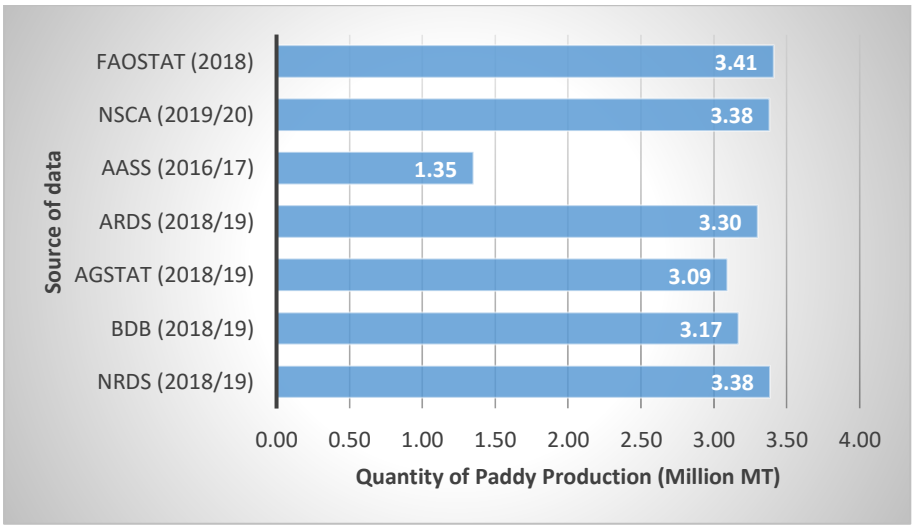


Figure 3: Comparison of quantity of paddy production from various data sources

79) The values from these databases range from 1.35 to 3.41 million MT. The latest data from AASS (2016/17), is a significant outlier and this is explained by the fact the agricultural year of survey was hit by severe drought that seriously affected yields and quantities. The difference between sources suggests inconsistence due to approximations, difference in

methodologies used for collection, processing, and analysis among custodians in their respective report writing and the difference in years of survey and publication.

80) Given the strength of the NSCA, as explained in the previous chapter, **it is recommended to adopt the figure 3.38 million metric tons (MT) from NSCA, as the baseline for this indicator.** This is also the value used in the document of NRDS-II.

3.2 Indicator 2: Total Area (Ha) Planted with Paddy and Area Harvested

81) The same seven databases also present data for this indicator (Figure 4). As shown, two sets of data are available, namely for area planted and for area harvested. The area planted with paddy is reported to range from 1.05 million hectares to 2.52 million hectares. The area harvested also ranges from 0.95 million hectares to 1.49 million Ha.

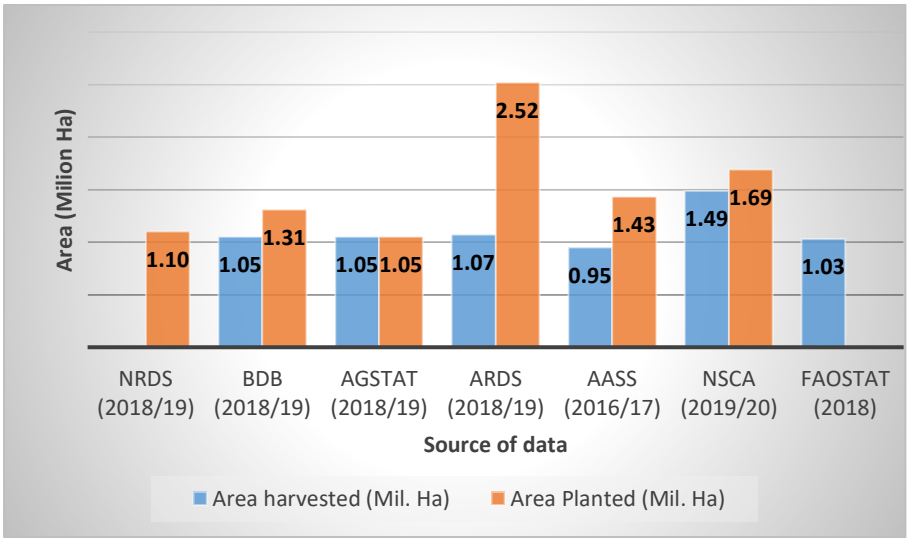


Figure 4: Comparison of paddy area planted, and area harvested from different sources

82) Again, given that NSCA and ARDS are, to a large extent, original data sets from which others make estimates, **it is recommended to use the NSCA figure of 1.69 million hectares planted with paddy and 1.49 million hectares harvested as the baseline for Indicator 2**. Again, this is because of the high quality and the consistence of the NSCA, compared to ARDS (*for which its figure on area planted is seriously out of range compared with the others*).

3.3 Indicator 3: Yield per Unit Area Planted and Area Harvested (MT/Ha)

83) As presented on Table 1, Indicator 2 is to be measured by area planted with paddy and Area harvested. Therefore, the figure for indicator 3, is obtained by a simple division of the proposed figure for indicator 1 (3.38 million MT), by the proposed figure for indicator 2 (1.69 million hectares), which result to 2.0 MT/Ha with respect to area planted.

84) For Area harvested the same calculation is done by dividing proposed figure for indicator 1 by proposed figure for Area harvested (1.49 million ha) which result to 2.3MT/Ha.

85) **It is recommended to adopt the NSCA figure of 2.3 MT/Ha as the baseline for Indicator 3(a) – yield per unit area harvested and 2.0MT/ha as the baseline for Indicator 3(b) – yield per unit area planted.**

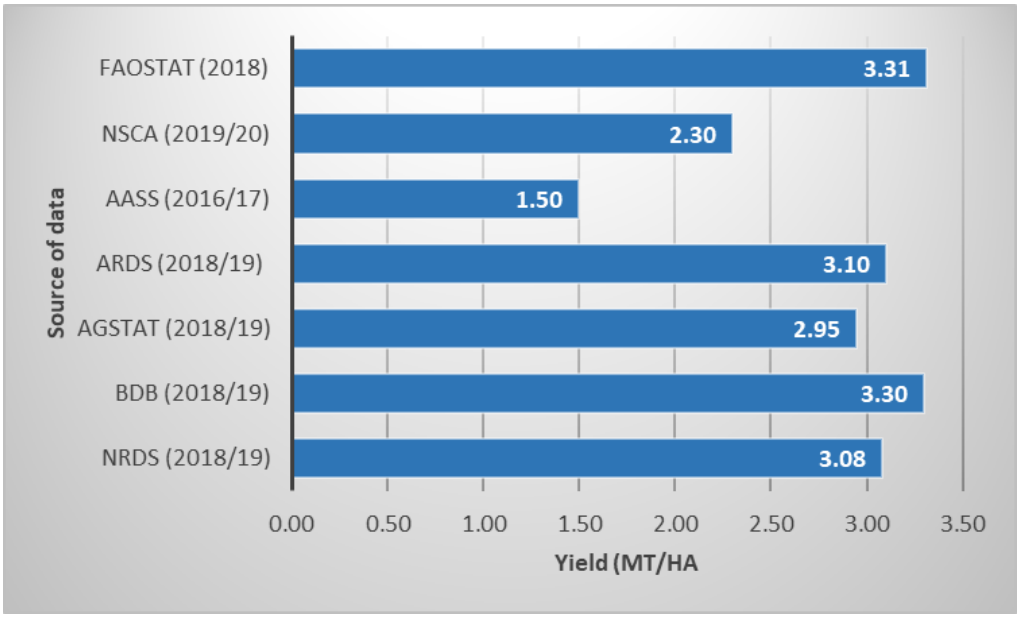


Figure 5: Comparison of yield data from different sources

3.4 Indicator 4: Self Sufficiency Ratio (%)

86) The Self Sufficiency Ratio (SSR) indicates the extent of food surplus, self-sufficient or deficit that will be available for use when production from a particular production season is compared with food requirement for the subsequent consumption year. SSR is calculated for cereals and non-cereals and is derived by comparing production and requirement whereby computation is done by calculating production over requirement expressed in percentage (P/R%). Figure 6 shows the SSR trends from year 2014/2015 to 2019/2020.

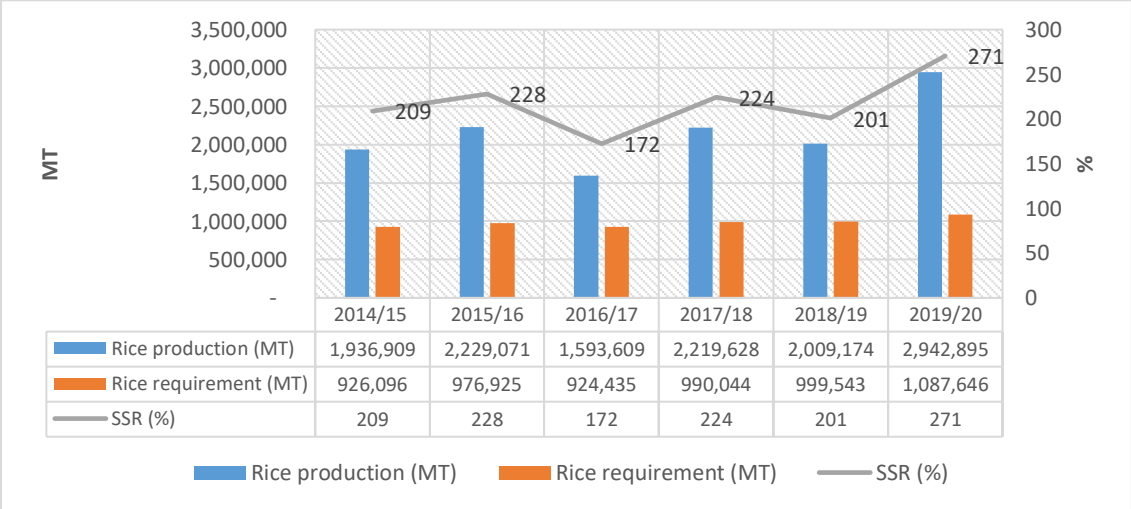


Figure 6: Rice SSR in Tanzania for the Period 2008/09 - 2018/19

87) The DNFS is the institution which has mandate to generate data on SSR annually and it is recommended to be the source of data for indicator 4. Therefore, **it is recommended to adopt the Rice SSR (**2018/19**) figure of 224% as the baseline for indicator 4 (Self-sufficiency ratio (%))**

3.5 Indicator 5: Area under Irrigation (Ha) for Paddy Production

88) In Chapter 5 of the National Irrigation Master Plan Phase II (NIMP-II) document, triangulation of several sources is used to estimate the Total Area under Irrigation as of 2015, to be 461,211 hectares. It was also estimated that this grew at an average rate of 22,000 hectares per year, from 2002 to 2015. This will therefore give an estimate that, as of 2018, the total area under irrigation would be 505,211 hectares.

89) It must be noted that, as per the NSCA (2019/20) report, section 3.3.1, **not all area under irrigation is for paddy**. At the same time, the irrigation data presented in NIMP-II document, are not disaggregated by crops and it is thus difficult to work out exactly the area of irrigation for paddy. The data from NSCA shows that the total area under irrigation for annual crops was only 272,897 ha in Mainland Tanzania (NBS, 2021). The NSCA then states in sub-section 3.3.2.1 that, *in Mainland Tanzania, 31,291 ha under paddy were irrigated during short rainy season; and 49,079 ha under paddy were irrigated during long rainy season, giving a total of only 80,370 ha.*

90) **It is therefore recommended that, the data from NSCA (2019/2020) be used to set the baseline for Indicator 5 - area under irrigation (Ha) for paddy production, at 80,370 ha.**

3.6 Indicator 6 – Quantity (MT/year) of Seeds (certified and QDS) of Resilient Varieties

91) As discussed in section 2.1.4, there are two main databases recording data for this indicator, the TOSCI and ARDS. However, it was decided to use TOSCI data because:
   a) The TOSCI Officers collect data directly from the source and no seed can be considered to be certified or QDS without production supervision and approval by TOSCI. Therefore, only the figures provided by TOSCI, are official by Law.
   b) It was therefore, concluded that the seed data entries in the ARDS, cannot at the moment be counted as reliable and thus it is recommended to use TOSCI data for the NRDS-II baseline and M&E.

92) **It is therefore recommended that the baseline for Indicator 6 (Quantity of seeds of resilient varieties), be set at 397.8 MT.**

3.7 Indicator 7 - Level of Industrial Milling Capacity (%)

93) The ARDS captures data on the number of milling machines. However, the inventory data does not classify milling machines according to their installed capacity.

94) The field survey undertaken during primary data collection covered a total of 173 paddy milling machines in Morogoro Municipality, Morogoro District Council (DC), Mvomero DC, Ifakara Town Council, Tabora Municipal Council, Shinyanga DC, Maswa DC and Nzega DC.

95) Key Informant Interviews were held with managers/supervisors and physical observations of the machines was done. It was found out that 58% of milling machines have an installed capacity of 2 MT/Hr or above. Raw data collected are as presented in Annex 5 (Volume 2) of this report. SATAKE SB 50 with de-husking and polisher components accounted for 48% of the total number of machines; followed by steel hullers at 13% and Multistage combined rice mills with intake pits, elevators, cleaner, husker, polisher, destoner & grading components and SATAKE SB 10 at 12 % each. (Fig 7).

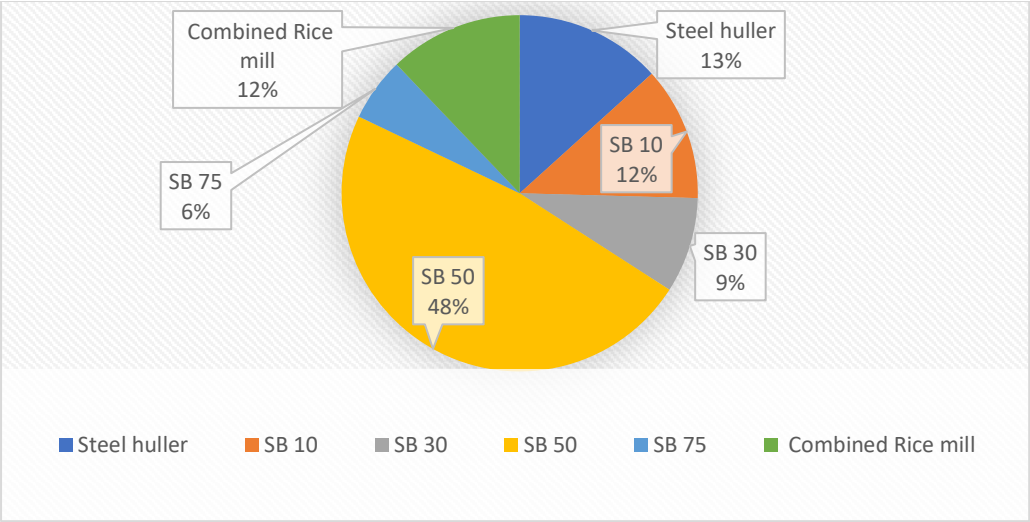


Figure 7: Type of Paddy Milling Machines in %

96) SATAKE SB 50 milling machines are preferred by commercial millers who operate toll milling- services for traders who collect and aggregate paddy in villages and sell milled rice to urban centres such as Dar Es Salaam, Dodoma, Mbeya, Morogoro and others. Some processors are now moving to multistage combined rice mills as they produce better quality milled rice compared to two stage SATAKE machines (Fig 8 & 9).

Figure 8: Satake SB 50 milling capacity 1.8 – 2.3 MT/Hour

Figure 9: Multi-stage combination rice mill with milling capacity of 1.5MT/hour

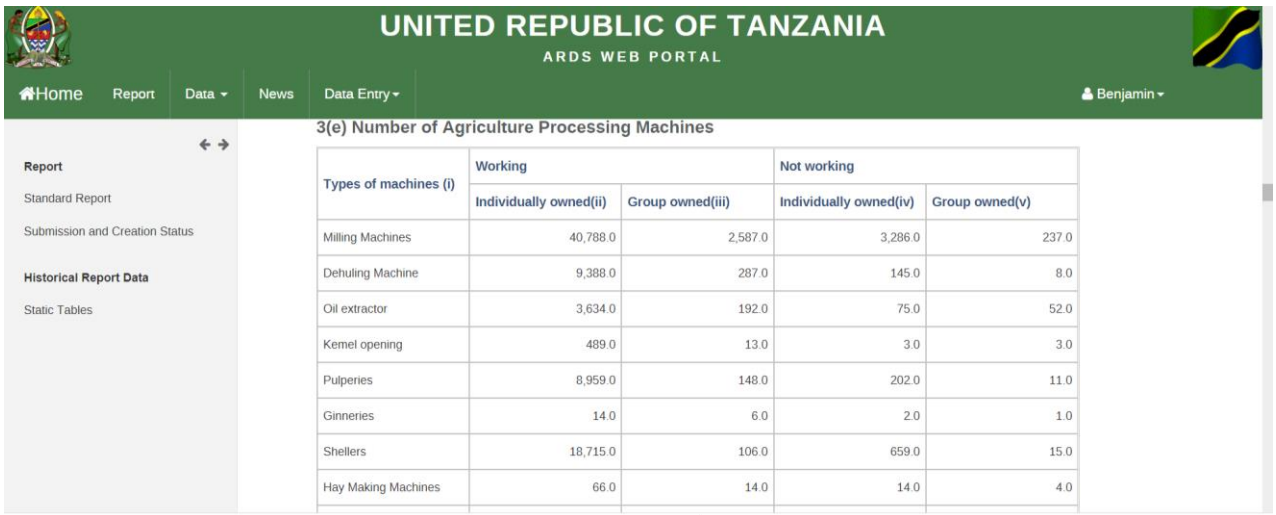
97) A study undertaken by Alemu D *et al* (2021) indicated that in Tanzania, about 56 per cent of the processors own two-pass machines (SB 50), followed by one-pass/polishing machine (31 per cent) and multistage combined rice mills at 13%. Hammond L. *et al*; (2000) also found out that 36% of the 22 surveyed milling machines in Morogoro MC and Ifakara TC in 2000 had an installed capacity of 2 MT/Hr and above (Hammond L., 2000).

98) However, in rural areas single-pass steel dehullers and rubber roller SATAKE SB 10 and SB 30 are more widespread mainly serving communities milling rice for home consumption. During the field survey in Tabora, it was found out that all the 26 visited mills in the township had a milling capacity of >2 MT/Hr (22 SB 50 and 4 SB 75 machines) while in the surrounding villages all the 29 visited mills comprised of 20 steel hullers, eight SB 10 and one SB 30 machine with milling capacity of less than 2 MT/Hr (Figures 10 and 11).

Figure 10: Steel Huller capacity 0.2 – 0.45MT/Hour

Figure 11: Satake SB10 with capacity of 0.6-0.9 MT/Hr

99) ARDS captures the total number of milling machines as illustrated in Figure 12. It is suggested that data should also be collected on installed milling capacity to capture the % of milling machines with the capacity of 2 MT/hour or above, in entry 3(e) of the report template illustrated in Figure 12. This will enable effective monitoring of Indicator 7.



Types of machines (i)	Working		Not working	
	Individually owned(ii)	Group owned(iii)	Individually owned(iv)	Group owned(v)
Milling Machines	40,788.0	2,587.0	3,286.0	237.0
Dehuling Machine	9,388.0	287.0	145.0	8.0
Oil extractor	3,634.0	192.0	75.0	52.0
Kernel opening	489.0	13.0	3.0	3.0
Pulperies	8,959.0	148.0	202.0	11.0
Ginneries	14.0	6.0	2.0	1.0
Shellers	18,715.0	106.0	659.0	15.0
Hay Making Machines	66.0	14.0	14.0	4.0

Figure 12: ARDS interface showing number of processing machines, not disaggregated by capacities

100) All the data collected were analyzed as shown in Annex 5 (Volume II) to arrive at the 58% of milling machines being above 2MT/hour. **It is recommended that the baseline for Indicator 7 - Level of industrial milling capacity (% of milling machine above 2MT/hour) be set at 58%.**

3.8 Indicator 8: Level of mechanization in production (number of machines)

101) Data for indicator 8 is available from ARDS and the NSCA (2019/20). There is a big difference on the number of tractors and power tillers reported by the two sources. The ARDS indicates that there were 16,339 tractors and 6,941 power tillers in Tanzania in 2018/2019 while the NSCA (2019/20) data shows that there were 105,403 tractors and 94,403 power tillers in 2019/2020 (Table 9).

Table 9: Number of agricultural machines in ARDS (2018/2019) and NSCA (2019/2020)

Source	Tractors	Power tillers	Combine Harvesters
NSCA (2019/20) (Total Tanzania)	105,403	94,403	Not available
ARDS (2018/19) (Total Tanzania)	16,339	6,941	810
Total machines in 64 major rice producing districts (ARDS)	4,096	5,635	267

102) The ARDS data is much closer to the findings of the comprehensive field survey that was conducted in all the 21 regions of mainland Tanzania (by then) in 2005 during the preparation of the Tanzania Mechanization Strategy (TAMS, 2006) established that there were 7,210 working tractors and 281 power tillers. Records from the DMI (MoA)/TRA show that a total of 11,906 tractors and 10,244 power tillers were imported to the country from 2006 to 2018.

103) Given, the findings of the previous surveys as shown above, it is difficult for the total number of tractors to have exceeded 19,116 and 10,525 for power tillers by 2018, since some machines went out of service or exceeded their life span. The Ministry of Agriculture currently (2021) puts the number of tractors at 21,149 and that of power tillers at 9,420.

104) Furthermore, as it was for irrigation, not all mechanization reported in the databases, is for paddy production. Therefore, as agreed with the NRDS-II TF and CARD Secretariat, mechanization levels in the 64 districts producing most of the rice in the country, should be used as a "proxy" for mechanization for paddy production in the country. The ARDS records show that, the total number of machines in these 64 districts, in 2018/2019 included 4,096 tractors, 5,635 power tillers and 267 combine harvesters (Appendix 6).

105) Therefore, **it is recommended to use the ARDS (2018/2019) figures to set the baseline for Indicator 8 (Level of mechanization in production (number of machines))** as follows:

a) Tractors = 4,096
b) Power tillers = 5,635
c) Combine harvesters = 267

3.9 Indicator 9: Share of local rice in the market (%)

106) There is no database keeping data on this indicator. So, as described in para 50 of this report, five (5) cities and/or municipalities were purposively selected for primary data collection from supermarkets in the cities of Arusha, Dar es Salaam, Dodoma, Mbeya and Morogoro (**see list in Annex 3 in Volume 2 of this report**). The respondents were Arusha (10); Dar es Salaam (19) Dodoma (3); Mbeya (3); and Morogoro (5).

107) Summary results were as presented in Table 10 and detailed data collected are in Annex 3 (Volume 2 of this report) as summarised below.

a) Table 10 (a) shows that, on average 85.4% of rice in supermarkets is locally produced. It was also found out that, the main characteristics attracting consumers to imported rice, are: long grain, being good raw material for "*biriani*"[7], and ability to remain granular after cooking.

Table 10(a): Average Share of local Rice in Supermarkets

	City	% of Local Rice Sold Supermarkets
1	Arusha City	69
2	Dar es Salaam City	98
3	Dodoma City	73
4	Mbeya Municipality	100
5	Morogoro Municipality	87
	Overall Average	85.4%

[7] **Biryani rice** is a popular Indian dish made with rice mixed with spices, herbs, yogurt, and onions.

b) Table 10 (b) shows that:

i) Local rice is also being branded for the supermarket outlets, and a total of eight brands were found in stock during the survey. However, some supermarkets also sell unbranded and/or unpacked rice. The price of local rice during the survey period, ranged between 1,800 and 4,000 Tshs/kg.

ii) Imported rice is mostly different branding of Basimati rice which is favorite for the *biryani* cuisine. A total of nine brands were found in stock during the survey. The price of imported rice during the survey period, ranged from 3,000 to 6,000 Tshs/kg.

Table 10 (b): Rice Sold in Supermarkets and Average Price (Tsh/kg) of various Rice Brands

City	Local Rice		Imported Rice	
	Brand	**Price Tshs/kg** *(May-July 2022)*	**Brand**	**Price Tshs/kg** *(May-July 2022)*
Dodoma	Heci Investment	3,650	India Basmati Stella	5,400
	Munawar	3,500	India Basmati Gautam	5,000
	Alaska	3,300	India Sona-masuri	5,000
	Morogoro Korie	3,000	India Basmati	5,000
	Unbranded	2,400		
Morogoro			India Basmati Stella	5,600
			India Basmati Gautam	5,300
			Sultan Premium	4,900
Arusha	NAFAKA (Magugu Rice)	1,800	1121 Basimati Sella	5,000
	KORIE Rice (blended)	3,000	XL Basimati	5,000
	MAGUGU - Premium	4,000	Thailand	3,000
	MAGUGU - Bown	3,500	Bul Bul	6,000
	NGUVU	4,000	India Basmati Gautam	6,000
	Not branded	2,500	Bopar	5,000
Dar es Salaam	KORIE Rice	3,000	Indian 1121 Sella Basmati rice	**5,000**
	Not branded	2,500		

108) Therefore, **it is recommended to use these survey data (June/July 2022), to set the baseline for Indicator 9 (Share of local rice in the market (%)) at 85.4%.**

3.10 Indicator 10: Quantity (MT/yr) of Seeds (certified and QDS) of High-yielding Varieties

109) With reference to discussion in section 2.1.4 and details in Table 5:

a) Out of the twenty-one (21) local varieties in the TOSCI variety catalogue, seed was produced and supplied locally as certified and QDS (during the baseline year of 2019/20), only for the varieties: TXD 306 (SARO 5), TXD 88 and Komboka. Also, seed for ARIZE GOLD variety were imported, certified, and distributed.

b) It is therefore, **recommended that the baseline for Indicator 10 (Quantity of seeds of high yielding varieties), be set at 359.3 MT/year.**

3.11 Indicator 11: Smallholder farmers' accessibility to financial services (%)

110) The data on smallholder farmers' accessibility to financial services is scattered and is being collected by several bodies for specific purposes. In 2018/2019, ARDS records indicate that a total of Tsh 60.6 billion was loaned to farmers for all crops. The National Sample Census of

Agriculture reported that only 3.8 percent of household members borrowed money from different sources for agricultural activities out of whom 25.9 percent received credit from family/friends/relatives; 22.3 percent received first credit from cooperatives; 16.9 percent received from private individuals, and 2.7 percent received their first credit from traders/trade store (Figure 13).

Table 5.1: Number and Percentage of Agricultural Household Members Reported to Borrow Money for Agricultural Activities During 2019/20 Agricultural Year, Tanzania

	Borrowed Money for Agricultural Activities		Did Not Borrow Money for Agricultural Activities		Total Households	
	Number of Households	Percent	Number of Households	Percent	Number	Percent
Mainland Tanzania	291,035	3.8	7,366,153	96.2	7,657,185	100.0
Tanzania Zanzibar	3,583	2.0	176,637	98.0	180,220	100.0
Tanzania	294,618	3.8	7,542,790	96.2	7,837,405	100.0

Figure 13: Number and Percentage of households reported to borrow in 2019/2020 agriculture year (Source: NSCA, Table 5.1, page 214)

111) The field survey undertaken in 8 irrigation schemes confirmed that formal lending through commercial banks is negligible as only 0.3% of the members of Irrigators Organizations received loans in 2018/2019 from banks (Annex 4, Volume 2). About 14.8% of rice farmers received loans from VSLA/VICOBA and NGOs while the majority about 73.3% relied on loans from Individuals and traders (Figure 14).

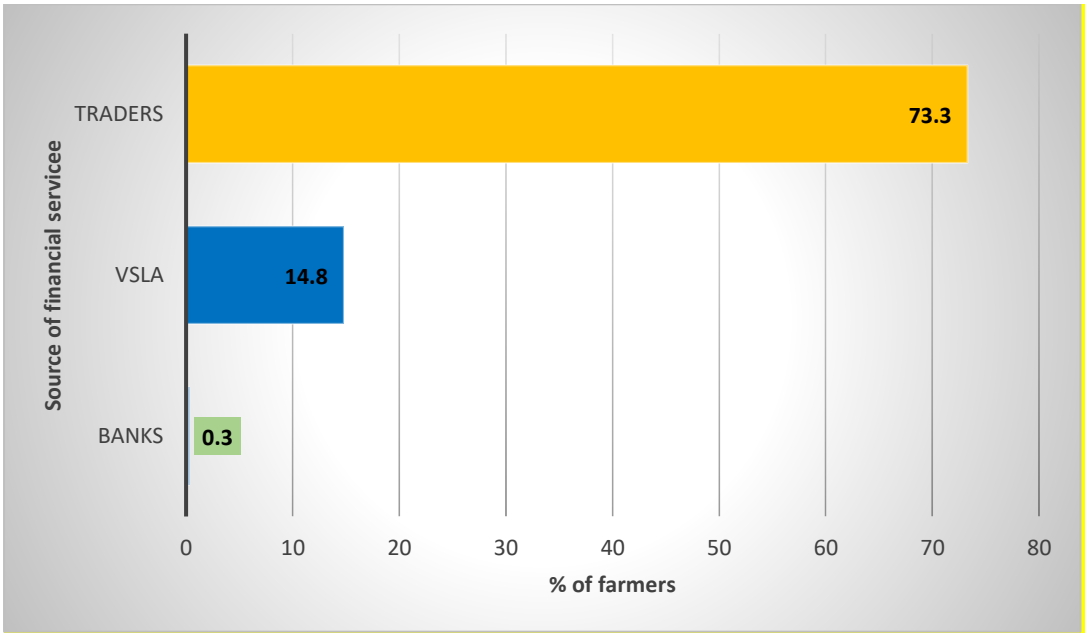


Figure 14: Percentage of smallholder farmers accessing financial services as indicated by Irrigators Organizations (Source: Baseline study, 2022)

112) From these observations we suggest that the baseline data should be taken from NSCA (2019/2020). The reason being that the sample size of 8 irrigation schemes taken in the field survey conducted by the baseline setting team was too small and statistically it cannot be generalized for the bigger population. For subsequent monitoring it is advised to track smallholder accessibility to financial services through the ARDS. However, to get figures for Rice value chain alone, we advise to configure ARDS to capture disaggregate data by crop.

113) **It is recommended that:**

a) **The baseline for indicator 11 be 3.8%, as estimated from the** NSCA(2019/2020).
b) ARDS data collection instruments should be reviewed to capture this data on regular basis and disaggregate by crops to enable M&E of this indicator, for NRDS-II and other national programs.

3.12 Indicator 12: Smallholder farmers' accessibility to technical training and services

114) The ARDS captures data on training conducted for farmers at village level. Improvements can be done to capture rice specific data on the number of farmers trained. Similarly, M-Kilimo may be used to capture such training. Data collected from KIIs during field survey in the 8 irrigation schemes shows that about 67.6% of farmers received training and 73.3% had the accessibility to Extension services (Fig 15).

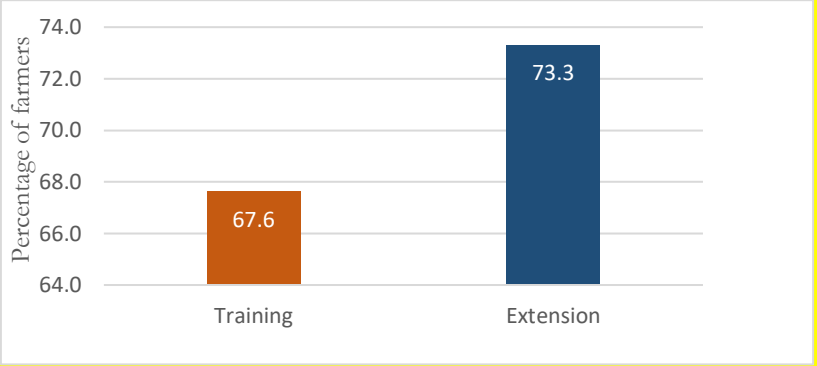


Figure 15: Training and Extension Services received by Farmers in survey IOs (Source: Baseline study, 2022)

115) However, the NSCA (2019/20) reports that only 7% of households received extension services in 2019/2020 which dropped from 67% recorded in 2007 census, and reasons are not clear.

116) **It is recommended that:**

a) **The baseline for indicator 12 to be 7%,** as estimated from the NSCA conducted in 2019/2020; and
b) This indicator should be captured by the ARDS for monitoring purpose and include option for capturing disaggregated data on annual basis.

3.13 Indicator 13: Fertilizer Adoption Rate (Kg/Ha) of Fertilizer Used in Paddy Production

117) It is proposed that the quantity of fertilizer used in paddy production (kg/ha) to be used for indicator 13 instead of the adoption rate (% of rice farmers). TFRA records the total fertilizer (segregated by type) used in the country annually while the area under paddy production is recorded in the NSCA. In 2018/2019 a total of 405,984 MT of fertilizer was utilized in the country including 100,826 MT of DAP and 137,097 MT of UREA (TFRA, 2019).

118) Of the total fertilizer used in crop production in Tanzania; about 43% is utilized in maize production, 16% in tobacco; and 10% in rice production (AFAP, 2019). The main fertilizers used in paddy production are Di-ammonium Phosphate (DAP) and UREA which account for about 20% of the respective fertilizers used in crop production (Annex 6 a & b Volume 2).

119) Assuming that 20% of fertilizer is used on paddy, then, in 2018/2019, about 47,585 MT of fertilizer (DAP and UREA) were used in paddy production out of the total 237,923 MT of DAP and UREA, which were utilized for all crops. This brings the utilization of fertilizer in paddy production to be 28 kg/ha based on the area under paddy production as reported by NSCA data base (Table 11).

Table 11: Fertilizer used in paddy production (kg/ha) in 2018/2019

Type of Fertilizer	**Total Fertilizer used in Crop production (MT)**	**Quantity of Fertilizer used in paddy production (MT)**	**Area planted paddy (HA)**	
				NSCA
DAP	100,826	20,165		
UREA	137,097	27,419		
Total	**237,923**	**47,585**		**1,690,000**
Total Fertilizer (DAP & UREA) used in paddy production (kg/ha)				**28**

Source: TFRA Reports 2017-2020

120) **It is recommended** to combine the TFRA data on fertilizer (MT) used per year, and the NSCA (2019/20) data on area cultivated with paddy, **to set the baseline for indicator 13 (**Fertilizer Adoption Rate (Kg/Ha) at **28 kg/ha.**

3.14 Indicator 14: Post-harvest losses (%)

121) The Division of National Food Security (DNFS) completing a study is being implemented to establish the current status, on this indicator. It is therefore recommended that the setting of baseline for this indicator should wait until the said studies has been completed.

4. Conclusion and Recommendations

4.1 Conclusions

122) The availability of statistical data from secondary sources, for the baseline and M&E of the NRDS-II, is significant in quantity. There are five main consistent databases that jointly account for 12 of the 14 indicators. The only indicators where there is no routine data being generated for, are indicators number 14 (Post Harvest loss (%)) and number 9 (share of local rice in supermarkets (%)).

123) The five routine databases, identified by this study, to be most suitable for the M&E requirements of NRDS-II, are:

a) The National Sample Census of Agriculture (NSCA) conducted every ten years with the last round implemented in 2019/20. It covers 12 indicators although for few of them, the data available is not realistic. Therefore, it is recommended to use NSCA in setting the baseline for indicator numbers: 1, 2, 3, 5, 11, and 12.

b) The Agricultural Routine Data System (ARDS) – which is based on continuous data collection surveys from village level and then aggregated at ward, district, regional and national level – also covers the 12 indicators, again with variability of quality for specific indicators. Therefore, it is recommended to use ARDS, in setting the baseline for only indicators: number 8.

c) The seed catalogue generated and kept by TOSCI was found to be adequate for the two indicators concerning seed, namely indicators 6 and 10.

d) The Annual Report produced by TFRA was found to be useful for indicator number 13. However, to effectively use this database for NRDS-II, it is recommended that the quantity (kg/ha) of fertilizer used be adopted instead of the adoption rate (% of rice farmers) – as the definition of this indicator.

e) The Agricultural Statistics (AGSTAT) report of the Ministry of Agriculture produced by the Division of National Food Security (DNFS) should be used for setting baseline data and M&E for Indicator 4 (Self-sufficient Ratio (%)).

124) The data for indicator 9 (share of local rice in the market (%)) should be collected through sample survey annually.

125) The survey on Post harvest losses conducted by the Division of National Food Security (DNFS) should be completed and be used to set baseline for this indicator and be conducted annually for M&E

4.2 Recommendations

126) Table 12 presents the recommended baseline figure for the 13 indicators as per the findings of the assessment presented in this progress report.

Table 12: Recommended Base Line Values

Indicator Variable		Recommended Base-line Value	Baseline Year[8]	Data Source Year[9]
1) Quantity of paddy production (**Million MT**)		3.38	2019/2020	NBS (2021)
2) (a)Total area (**Million Ha**) planted with paddy		1.69	2019/2020	NBS (2021)
(b)Total area (**Million Ha**) harvested with paddy		1.49	2019/2020	NBS (2021)
3) (a) Yield (**MT/Ha**) per unit area planted		2.00	2019/20202	Calculated
(b) Yield (**MT/Ha**) per unit area harvested		2.30	2019/2020	Calculated
4) Self-sufficiency rate **(%)**		224.00	2017/2018	URT (2019)
5) Area (**Ha**) under irrigation for paddy production		80,370.00	2019/2020	NBS (2021)
6) Quantity (**MT/year**) of seeds of resilient varieties		397.80	2019/2020	TOSCI (2020)
7) Level of industrial milling capacity **(%)**		58.00	2018/2019	Survey 2022 ARDS
8) Level of mechanization in production (**Nos of Machinery**)	(a) Tractors	4,096.00	2018/2019	ARDS
	(b) Power tillers	5,635.00	2018/2019	ARDS
	(c) Combine harvesters	267.00	2018/2019	ARDS
9) Share of local rice in the market **(%)**		85.40	2022	Survey 2022
10) Quantity (**MT/year**) of seeds of high-yielding varieties		359.30	2019/2020	TOSCI (2020)
11) Smallholder farmers' accessibility to financial services **(%)**		3.80	2019/2020	NBS (2021)
12) Smallholder farmers' accessibility to technical training and services **(%)**		7.00	2019/2020	NBS (2021)
13) Fertilizer utilized (kg/ha) by farmers in paddy production		28.00	2017/2018	TFRA (2020)
14) Post-harvest losses **(%)**		N/A	2021/22	AGSTAT

127) It is also strongly recommended that efforts should be made to **merge the AASS of NBS, with the ARDS of MoA**, so as to strengthen the data on Agricultural Years (October – September) – to enable quality M&E of not just the NRDS-II, but the entire agricultural sector. The significant increase of the budget for agriculture, requires that M&E is also strengthened to ensure the increased funding is not wasted

[8] The year data was collected

[9] The year the report was published

Appendix 1: Data Table Seed Quantity

S/ No.	Name of the Variety	Characteristics (tick where appropriate)		QUANTITIES OF CERTIFIED + QDS SEED (MT)				
		Resilient	High-yielding	Locally produced (MT)	Quantity Imported (MT)	Total (Local + Imported)	Amount Exported (MT)	Net Used the Country (MT)
1								
2								
3								
4								
5								
6								
7								
8								
9								

Appendix 2: Questionnaire for milling capacity

Business name/Millers' association:					
Respondent name:		Designation:		Mobile contact:	
Location/Street:					
District:					
Region:					
Number of milling machines installed		Year installed	Installed milling capacity (MT per hour)	Utilized capacity (MT per day)	Number of months operating per year
Machine 1					
Machine 2					
Machine 3					
Machine 4					
Machine 5					
Machine 6					
Machine 7					
What are the major challenges affecting your installed milling efficiency? ……. ……. …….					

Appendix 3: Market Survey Questionnaire

1. Name of supermarket:					
2. Respondent name:	Designation:			Mobile contact:	
3. Location/Street:					
4. District:					
5. Region:					
6. Do you sell imported rice? Put √ where appropriate	Yes		No		
7. What was the percentage (%) of imported rice out of the total quantity of rice sold in your shop in year 2018?					
8. Branding and price					
i) Percentage of local rice which was branded					
ii) Percentage of imported rice which was branded					
iii) Average price of branded local rice					
iv) Average price of branded imported rice					
v) Average price of local unbranded rice					
vi) Average price of unbranded imported rice					
9. What is the uniqueness of imported rice that attracts customers?	i) ……..……... ii) …… iii) ……				

Appendix 4 Data collection from Irrigators organizations (access to finance)

1. Access to finance					
Name of irrigation scheme:					
Respondent name:	Designation:		Mobile contact:		
Location/Street:					
District:					
Region:					
Number of members of IOs		No. of Male		No. of Female	
Did your members receive any financial service in 2018/19 season? Put √ where appropriate	Yes		No		
Types of financial services received	Number of recipients of financial services				
Inputs credits					
Cash loans					
Members in VSLA/VICOBA					
Others (mention)					
What is the percentage (%) of members of irrigators organization that received financial services in year 2018?					
2. Access to training and extension services					
i) What is the percentage (%) of members of irrigators organization who have received training in year?	……..				
ii) Which organizations are providing training in your scheme	(i) …… (ii) …… (iii) ……				
iii) What is the percentage (%) of members of irrigators organization who have received extension services in year?	……..				
iv) Mention the providers of extension services	i) …… ii) …… iii) ……				

Appendix 5: Assessment of Quality of Data from Different Sources

Source of data	Data Collected	Validity	Timeliness	Completeness	Accuracy	Relevance	Consistence
NRDS	**Indicator No. 1, 2, 3, 4, 5, 6, & 10**	Data cited from official database e.g., MoA, NBS, AGSTAT, ARDS	Continuous tracking of data during M&E	There are gaps or missing data and for some indicators are not segregated	Dependence on the source of data	Official data cited from reliable source	Capture data from MDAs and other actors in rice value chain
ARDS	**Indicator No. 1, 2, 3, 5, 6, 8, 10, 11 & 12**	Data collected from village, ward and compiled at district level and checked at regional and national level using guidelines provided	Data collection regular on monthly, quarterly and annually	There are gaps or missing data and for some indicators are not segregated e.g., milling capacity data	Data collection methodology documented but verification and validation not done regularly	Official source of data collected through local government system and aggregated at national level	Collected regularly from village to regional levels
NSCA	**Indicator No. 1, 2, 3, 5, 8, 11, 12 & 13**	Methodology well documented, systematic, and consistent	Data collected every 10 years.	There are gaps or missing data and for some indicators are not segregated	Data collected from statistically valid samples with proper guidelines	Official data collected from all regions	Methodology well documented and executed with adequate supervision
AGSTAT/ DNFS	**Indicator No. 1, 2, 3, 4,**	Methodology documented and data collected from village and aggregated at national level. This is the basis for national food security forecast	Data collected twice a year in the crop production season	Regular checks done across location and over time	Data collection methods well documented and used across locations from village to regional level	Officially adopted by government and is the basis for national food security forecast	Data is collected twice annually and published. Data is triangulated with data from TMA and NBS
FAOSTAT	**Indicator No. 1, 2, 3, 5, & 8**	Triangulated from various Official source based on national data	Regularly published and up-dated annually	Missing some data required as per NRDS II indicators	Involve official and computed data – but with no direct collection of data	Official database and published	Methodology well documented
AASS	**Indicator No. 1, 2, 3,**	Methodology well documented, but data quality not guaranteed	Data collection is not regular as envisaged (not done annually)	Do not cover all indicators required by NRDS II	Guidelines provided but weak in its execution	Official data	Methodology well documented
BDB	**Indicator No. 1, 2, 6, 8, 10, 11, & 12**	Data compiled from official database e.g., NSCA, AGSTAT, ARDS and published by MoA	Not published regularly	Most data collected, but missing data	Compilation involves synthesis of data, dependent on the	Official data cited from reliable source	Done at national level from reliable sources

Source of data	Data Collected	Validity	Timeliness	Completeness	Accuracy	Relevance	Consistence
				(indicator 4, 5, 7, 9, 13, & 14)	quality from the source of data		
TOSCI	**Indicator No. 6, & 10**	Scientifically proven methodology for data collection	Done every season at specified intervals	Thoroughly done using guidelines, but data is not disaggregated based on NRDS indicators	Methodology and execution done according to guidelines	Authority in seed certification	Done across different location and over time using provided guidelines
TFRA	**Indicator No. 13**	Official data for government monitoring of fertilizers manufactured and imported	Regular data and monthly reports produced	Captures only indicator 13 on fertilizer quantities, demand and utilization	Capture data on monthly basis	Authority mandated by government	Done across different locations from district, regional and national levels and over time
MIIT	**Indicator No. 7**	No clear guidelines provided for data collection	Not regular	Captures only data for indicator 7	Not clear methodology on data collection	Data not disaggregated by the capacity and size of the mills	Variability from one district to the other due to lack of guidelines for data collection

Notes

1. **Data quality assessment definitions**
   a) **Validity**: This involved checking how suitable is the methodology used by the source provides the best national level data for measuring an indicator.
   b) **Consistence**: This involved checking whether similar methodology of data collection is used across different locations and over time.
   c) **Timeliness**: This involved checking whether data can be accessed from custodian at clearly defined regular interval.
   d) **Completeness:** This involves checking the extent how required data were collected (whether there are gaps or missing data) across locations and over time.
   e) **Accuracy:** This involves checking how data collection and handling processes are ensure less or zero errors.
   f) **Relevance**: This involves checking how data collected by the custodian is considered useful in decision making and accepted by authorities.
2. NRDS II baseline indicator setting may not rely on single source of data, hence triangulation was necessary. Outcomes of the baseline data set is based on individual data source assessment for respective indicators.

Appendix 6: Number of Tractors and Combine Harvesters in 64 major rice producing districts 2018/2019

July 2018 - June 2019 Ranking	District	Production MT	Region	Tractors	P/Tiller	Combine Harvester
				Total	Total	Total
1	Morogoro Vijijini	343,064	Morogoro	70	21	1
2	Mlimba	260,378	Morogoro	204	189	44
3	Mbarali	246,628	Mbeya	286	2941	124
4	Msalala	196,228	Shinyanga	35	11	0
5	Ifakara Mjini	129,466	Morogoro	237	110	11
6	Malinyi	102,273	Morogoro	116	57	8
7	Tunduru	93,765	Ruvuma	28	52	0
8	Mpanda Vijijini	88,086	Katavi	7	5	0
9	Igunga	78,080	Tabora	97	115	3
10	Sumbawanga Vijijini	64,147	Rukwa	21	64	1
11	Momba	58,705	Songwe	16	14	0
12	Geita Vijijini	56,862	Geita	13	0	0
13	Kyela	56,259	Mbeya	39	91	0
14	Mbogwe	50,626	Geita	19	21	0
15	Iringa Vijijini	44,328	Iringa	243	835	9
16	Ulanga	33,879	Morogoro	86	47	3
17	Bukombe	31,911	Geita	4	5	0
18	Kilosa	29,456	Morogoro	394	120	13
19	Kahama	27,082	Shinyanga	25	5	0
20	Kaliua	26,610	Tabora	7	9	0
21	Songea Vijijini	26,384	Ruvuma	30	15	3
22	Manyoni	26,329	Singida	60	47	1
23	Korogwe Vijijini	23,812	Tanga	95	55	4
24	Ikungi	22,834	Singida	15	11	0
25	Mvomero	22,140	Morogoro	190	47	9
26	Nyang'hwale	22,098	Geita	36	42	0
27	Namtumbo	21,806	Ruvuma	44	22	0
28	Ushetu	20,173	Shinyanga	12	9	0
29	Maswa	19,064	Simiyu	81	54	1
30	Chalinze	18,155	Pwani	88	7	0
31	Nkasi	17,664	Rukwa	39	35	5
32	Uyui	14,127	Tabora	0	0	0
33	Same	13,899	Kilimanjaro	33	61	2
34	Kwimba	13,375	Mwanza	78	47	0
35	Tabora Mjini	10,900	Tabora	7	2	0
36	Moshi Vijijini	10,861	Kilimanjaro	113	42	2
37	Nzega Vijijini	9,854	Tabora	16	17	0
38	Magu	8,916	Mwanza	61	43	2
39	Sikonge	8,880	Tabora	4	13	0
40	Meru	8,497	Arusha	269	53	5

July 2018 - June 2019 Ranking	District	Production MT	Region	Tractors	P/Tiller	Combine Harvester
				Total	Total	Total
41	Rufiji	7,969	Pwani	63	8	0
42	Mtama D.C.	6,779	Lindi	21	5	0
43	Meatu	6,068	Simiyu	266	27	0
44	Biharamulo	5,852	Kagera	8	7	0
45	Ruangwa	5,671	Lindi	75	29	0
46	Buchosa	5,221	Mwanza	8	6	0
47	Ukerewe	5,131	Mwanza	0	31	0
48	Ileje	4,740	Songwe	4	6	0
49	Masasi Vijijini	4,175	Mtwara	120	2	0
50	Busokelo	3,965	Mbeya	3	2	0
51	Chunya	3,769	Mbeya	28	13	3
52	Sengerema	3,630	Mwanza	28	31	2
53	Kilwa	3,378	Lindi	14	8	0
54	Chato	3,240	Geita	19	3	0
55	Kibondo Vijijini	2,953	Kigoma	4	2	0
56	Muleba	2,908	Kagera	2	0	0
57	Mtwara Vijijini	2,235	Mtwara	6	1	0
58	Misungwi	2,013	Mwanza	93	62	0
59	Musoma Vijijini	1,501	Mara	14	0	0
60	Nsimbo	0	Katavi	11	10	0
61	Babati Vijijini		Manyara	66	0	11
62	Geita Mjini		Geita	9	6	0
63	Tandahimba		Mtwara	0	0	0
64	Kasulu Vijijini		Kigoma	16	42	0
	Total	**2,438,796.20**		**4096**	**5635**	**267**

Source ARDS 2018/2019

Appendix 7: Documents Collected and/or Reviewed

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Alemu D.; Isinika A.; Odame H.; and Thompson J. (2021) The Role of Small-Scale Processors in Supporting Agricultural Commercialization among Smallholder Rice Farmers in East Africa: Lessons from Ethiopia and Tanzania. Agricultural Research Policy in Africa (APRA) WP 74 24pp

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