FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

BASELINE STUDY
ABRIDGED VERSION

FEED THE FUTURE SENEGAL–NAATAL MBAY

CONTRACT AID-685-C-15-00001

USAID
FROM THE AMERICAN PEOPLE

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TABLE OF CONTENTS

LIST OF TABLES 4
LIST OF CHARTS 6
LIST OF MAPS 6
ACRONYMS 7
EXECUTIVE SUMMARY 10
1. INTRODUCTION 12
1.1 Study Objectives 12
1.2 General Project Overview 12
2. METHODOLOGY AND DATA 13
2.1. Study Population and Geographic Coverage 13
2.2. Households Sampling Frame 13
2.3. Sample Size 14
2.4. Indicators Calculation Method 14
2.5. Collection Tools and Reporting Units 14
2.6. Surveyor and Supervisor Training 15
2.7. Data Feedback 15
2.8. Quality Control and Data Analysis 16
2.9. Study Resources 16
2.9.1. Main Team Composition 16
2.9.2. Data Collection Team Composition 16
2.10. Data Collection Review 16
2.11. Data Analysis Options 18
3. GENERAL HOUSEHOLD CHARACTERIZATION 20
3.1. Gender of Household Heads 20
3.2. Household Types 20
3.3. Poverty Level 21
3.4. Weight of Agriculture in Household Revenue 24
3.5. Households Benefiting from Project Support 25
3.6. Household Size 26
3.7. Household Composition by Age Category and Gender 27
3.8. Education Level of Household Heads and Members 28
3.9. Primary Activities of Household Heads 30
4. PRODUCTION PROFILE OF FARMING HOUSEHOLDS 31
4.1. Land Resources 31
4.2. Crop Types 33
4.3. Human Capital and Land Management 34
5. PRODUCTION AND MARKETING 36
5.1. Production Costs and Yields 36
5.2. Marketing 37
5.3. Contractualization 38
6. FARMING TECHNOLOGIES AND GOOD PRACTICES 39

6.1. Soil Preparation 39
6.2. Quality Seeds 40
6.3. Fertilization 43
6.4. Weeding 44
6.5. Harvesting and Threshing 44
6.6. Storage 45

7. BASELINE LEVELS OF SELECTED INDICATORS 47

7.1. Gross margins per hectare 47
7.2. Harvest Marketing 48
7.3. Use of Promoted Technologies and Management Practices 50
7.4. Surface Areas Concerned by the Use of Improved Technologies and Management Practices 51
7.5. Accessing and Using Agro-climatic Information 53
7.6. Agricultural and Rural Loans 54
7.7. Agricultural Insurance 56
7.8. Marketing Contracts 57
7.9. Quantities Produced by Farming Households 57
7.10. Farmers Access to Loans via Networks and Organizations 58

APPENDIX A: INDICATORS CALCULATION METHOD 60

LIST OF TABLES

Table 1: Survey Zones and Sub-Zones 15
Table 2: Collection Strata and Survey Reviews: Forecasts and Implementation 17
Table 3: Collection Review by Type of Household in each Zone and Sub-Zone 18
Table 4: Distribution of Targeted Crops in Areas of Influence 18
Table 5: Distribution of Targeted Crops in Administrative Districts 19
Table 6: Distribution of Households According to Gender of Household Head 20
Table 7: Distribution of Household Types 20
Table 8: Household Poverty Level According to USAID PAT with a US$ 1,25 threshold (PPA, 2009) .. 22
Table 9: Household Poverty Level According to USAID PAT with a US$1.9 threshold (PPA, 2009) 23
Table 11: Income Shares of Different Sources in Total Household Income by Zone and by Gender of Household Head 25
Table 12: Households Benefiting from Project Support 26
Table 13: Average Household Size and Age of Household Heads 26
Table 14: Household Structure by Gender and Age Category 27
Table 15: Education Level of Household Numbers by Gender of Household Members and Household Head (% line) 28
Table 16: Education Level of Household Heads (line %) 29
Table 17: Main Activities of Household Heads (line %) 30
Table 18: Distribution of Household Parcels by Parcel Type 31
Table 19: Distribution of Household Parcels by Type of Ownership 32
Table 20: Distribution of Parcels by Mode of Operation and Crop 32
Table 21: Distribution of the Number of Plots Sown by Type of Crop and Zone 33
Table 22: Value Chain Shares (Rice, Millet, Maize) of Sown Areas by Zone 34
Table 23: Distribution of Farmers by Gender of Household Head (HH) and Zone 35
Table 24: Distribution of Parcel Leaders by Gender and Value Chain 35
Table 25: Average Age of Parcel Leaders by HH Gender and Zone 36
Table 26: Distribution of Plots by Type of Soil Preparation and by Value Chain 39
Table 27: Distribution of Farmed Plots by Type of Soil Preparation and by Value Chain 40
Table 28: Use of Certified Seeds by Gender of Household Head and by Zone 41
Table 29: Seeding Method by Value Chain 42
Table 30: Origin of Seeds by Value Chain 42
Table 31: Use of NPK, DAP and UREA Fertilizers by Value Chain 43
Table 32: Fertilizer Application Method by Value Chain 43
Table 33: Primary Weed Control Method by Value Chain 44
Table 34: Primary Harvesting Method by Value Chain 44
Table 35: Primary Threshing Method by Value Chain 45
Table 36: Harvest Storage Methods by Value Chain 45
Table 37: Methods for the Preservation of Harvest Stocks by Value Chain 46
Table 38: Storage Methods for White Rice and Maize and Millet Grains 46
Table 39: Preservation Methods for White Rice and Maize and Millet Grains 47
Table 40: Gross Margins per hectare (CFAF) 47
Table 41: Sales Revenues of Households having sold production on the market 49

Table 42: Average Values of Rice Sales by Season (households having sold on the SRV market) 50
Table 43: Average Sales Revenues of All Households 50
Table 44: Farmers Having Implemented an Improved Technology or Management Practice Within Households 51
Table 45: Number of Hectares by Type of Household Implementing Improved Technologies or Management Practices (Indicator 5) 52
Table 46: Number of Hectares Sown by Households Implementing Improved Technologies or Management Practices (Indicator 5) 53
Table 47: Use of Climate Information: Selecting Crop Types (Indicator 7) 54
Table 48: Use of Climate Information by Household Type 54
Table 49: Value of Agricultural and Rural Loans in CFAF (indicator n°12) 55
Table 50: Value of Agricultural and Rural Loans by Area of Influence (CFAF) 56
Table 51: Households with at Least One Farmer with an Agricultural Insurance Policy (indicator 14) 56
Table 52: Average Number of Farmers with Agricultural Insurance 56
Table 53: Households with at least One Farmer Benefiting from a Marketing Contract 57
Table 54: Number of Buyers Having a Contract with Household Farmers (indicator 15) 57
Table 55: Production Volumes by Targeted Value Chain in kg (indicator 16) 57
Table 56: Distribution of Households with Farmers Having Access to Loans via their Organizations 58
Table 57: Average Number of Farmers Having Access to Loans via their Organizations 58

LIST OF CHARTS

Chart 1: Distribution of Households Having Sold Part of their Production 48
Chart 2: Level of Access to Formal Loans for Rice, Millet or Maize Farming 55

LIST OF MAPS

Map 1: Georeferencing Map of Surveyed Localities 17

ACRONYMS

ANSD	Agence nationale de la statistique et de la démographie (National Statistics and Demography Agency)
ASPRODEB	Association Sénégalaise pour la Promotion du Développement à la Base (Senegalese Association for the Promotion of Grassroots Development)
ACEP	Alliance de Crédit et d'Epargne pour la Production (Alliance for Production Credit and Savings)
GA	General Assembly
SP	Service Provider
BNDE	Banque nationale de développement du Sénégal (National Development Bank of Senegal)
CIFA	Centre Interprofessionnel pour la Formation aux Métiers de l'Agriculture (Interprofessional Training Center for Agricultural Trades)
CIRIZ	Comité interprofessionnel du RIZ (Interprofessional Rice Committee)
CLUSA	Cooperative League of United States of America / Capacity-building Project for the Millet Value Chain
HH	Head of Household
COS	Cold Off-Season
CMS	Crédit Mutuel du Sénégal (Credit Union of Senegal)
CNAAS	Compagnie Nationale d'Assurance Agricole du Sénégal (National Agricultural Insurance Company of Senegal)
CNCAS	Caisse Nationale de Crédit Agricole Sénégalaise (National Agricultural Credit Fund)
HOS	Hot Off-Season
VC	Value Chain
DA	Directorate of Agriculture
DAPSA	Direction de l'Analyse, de la Prévision et des Statistiques Agricoles (Directorate of Agricultural Analysis, Forecasting and Statistics)
DISEM	Division des Semences *(Seeds Division)*
CD	Census Districts
DRDR	Direction Régionale du Développement Rural (Regional Directorate of Rural Development)
CFAF	Franc Communauté Financière Africaine (African Financial Community Franc)
FONGS	Fédération des Organisations Non Gouvernementales du Sénégal (Federation of Non-Governmental Organizations in Senegal)
FTF	Feed the Future

FPA	Fédération des périmètres autogérés du Sénégal
GPS	Global Positionning System
HRM	Human Resources Management
Ha	Hectare
HBM	Farming construction and equipment company
ISRA	Institut Sénégalais de Recherches Agricoles (Senegalese Institute for Agricultural Research)
IPAR	Initiative Prospective Agricole et Rurale
IRG	International Resources Group
Kg	Kilogram
IBV Millet	Millet variety
PAN Millet	Millet variety
GCO	Grassroots Community Organization
ODK	Open Data Kit
GMO	Genetically Modified Organism
NGO	Non Governmental Organization
FO	Farmers' Organization
PAFA	Projet d'Appui aux Filières Agricoles (Support Project for Agricultural Value Chains)
WFP	World Food Program
PAMECAS	Partenariat pour la Mobilisation de l'Epargne et du Crédit Au Sénégal (Partnership for Credit and Savings in Senegal)
PAT	Poverty Assessment Tool
PCE	Projet Croissance Economique *(Economic Growth Project)*
PMP	Performance Monitoring/Management Plan
PSE	Plan Sénégal Emergent (Plan for the Emergence of Senegal)
PRACAS	Programme de Relance et d'Accélération de la Cadence de l'Agriculture Sénégalaise *(Programme for the Recovery and Acceleration of* Agricultural Growth in Senegal)
HQ	Household Questionnaire
RESOPP	Réseaux des Organisations Paysannes et Pastorales du Sénégal (Network of Farming and Pastoral Organizations in Senegal)
SAED	Société Nationale d'Aménagement et d'Exploitation des Terres du Delta du Fleuve Sénégal et des Vallées du Fleuve Sénégal et de la Falémé *(Society for the development and use of the Senegal River Delta and* Valleys)
SODAGRI	Société de Développement Agricole et Industriel du Sénégal (Senegalese Farming and Industrial Development Company)
TSE	Tracto Service Équipement

U-IMCEC	Union des Institutions Mutualistes Communautaires d'Epargne et de Crédit
APU	Agricultural Production Unit
USAID	United States Agency for International Development
US $	United States dollar
SRV	Senegal River Valley
SFZ	Southern Forest Zone
ZI	Zone of Influence (Feed the Future)

EXECUTIVE SUMMARY

Feed The Future Senegal Naatal Mbay builds on the USAID Economic Growth Project (USAID/PCE) with an implementation timeline planned over 4 years starting from March 2015. It aims at scaling up the models and approaches for the development of cereal value chains that have been designed for the benefit of small farmers in the zones of influence. The objective is to reach 150,000 beneficiary households by 2019. The main study objectives are to establish baseline monitoring and evaluation indicators for the Project's zones of influence, build connections to link outcomes with project activities and gain a better understanding of future beneficiaries to improve decision-making and planning.

The Zone of Influence was divided into geographical strata reflecting the different agro ecological zones and subzones. The initially target sample size was established at 2000 households distributed proportionally to the weight of each of the six (6) sub-zones identified. The Census Districts (CD) of the National Agency of Demography and Statistics served as a first stage sampling frame. A CD is a relatively homogenous geographical cluster of approximately 100 households and 295 of them were randomly drawn in a first stage. In each sampled CD, 10 households were drawn at random from the list of heads of households or the numbers on the CD maps provided by ANSD. At the end, 2071 households were covered, including 21 that are not primarily engaged in farming activities.

Results corroborate, for the most part, literature elements on the general characteristics of rural households and on poverty profiles. Heads of households are men (95%) and in 97% of cases, there is in each household at least one adult man and one adult woman. Globally, 37% of the sample households belong to the "very poor" category and live with less than US$ 1.25 per day and poverty increases from North to South. Although the results are alarming (15%) in the Senegal River Valley (SRV-irrigated rice), the Southern Groundnut Basin (SGB) is comprised of 20% of "very poor" households, while record numbers are found in Casamance with 48% for rain-fed rice and 67% for maize. Households living with revenues ranging between US$1.25 and US$2.5 per day and categorized as "poor" make up 50% of the sample. Globally, less than 15% of the sample can be categorized as "not poor". With the new US$ 1.9/day threshold recommended by the World Bank, 87.6% the sample is comprised of "very poor" households. This category makes up the vast majority of the households in all target zones.

The dominant role of farming as a source of income for the households is a key characteristic of the sample. Farming revenues comprise more than 50% of the total income in 81% of households. This heavy reliance on farming is noticeable is all the value chains and zones covered by the survey. Surprisingly, only 15% of households report having benefited from project support in their farming activities. The numbers are better in the Southern Groundnut Basin, where they vary between 20% and 25%.

A strong presence of target value chains. The analysis of survey data regarding sown areas shows that the target crops have a strong presence in the crop rotation. In the SRV, irrigated rice occupies 53% of the areas sown, while in the SGB, millet and maize share 50% of farmed parcels. In Casamance, rain-fed rice and maize account for 39% of sown areas.

Nearly all households have at least one farmer having applied an improved technology promoted by the project. However, there are strong variations according on the technology and the zone. Fertilization practices are the most widespread (99%), followed to a lesser degree by soil preparation practices (74%)

and the use of certified seeds (69%), while the subscription to insurance policies still struggles to emerge. Geographically, significant differences can be observed. In the North, soil preparation and fertilization

practices are the most used whereas in the Southern Groundnut Basin, the use of certified seeds reaches the highest averages. In Casamance, the strong presence of fertilization and to a lesser extent soil preparation technologies should be noted.

Access to credit remains low. Survey results show that formal credit in the form of cash loans for rice, maize or millet production concern only 8% of households across the total sample and are seasonal loans for the most part. The most significant results are recorded in the SRV, where approximately a third (31%) of the rice-farming households benefit from formal loans. However, drastically lower rates are recorded in the other regions – 2% for Casa-rain fed rice, and approximately 4% each for SGB-maize, Casa-maize, and SGB-millet. Agricultural and rural loans have an average value of CFAF 246,780, although the amount varies according to the value chain and zone. Loans for the production of irrigated rice have an average of CFAF 279,941 in the SRV against approximately CFAF 120,375 for rain fed rice in Casamance. As for maize production, the average loan value is CFAF 260,500 in the SGB and CFAF 181,952 in Casamance. The average loan value for millet production in the SGB is around 153,095 CFAF. One of the defining characteristics of the irrigated rice value chain in the SRV is its longstanding integration to the market and the existence of experienced organizations (FOs, economic interest groups and unions) with the capacity to build contractual relationships with financing institutions. In the other zones, some progress has been noted, especially in the gradual construction of networks and the organization of the value chains.

Varying performances according to value chains and zones. The highest yields were recorded in the SRV for irrigated rice, with 7,050 kg/ha in the Delta and 4,285 kg/ha in the Middle Valley. Rain fed zones display lesser performances with 793 kg/ha in the SGB and 671 kg/ha in Casamance. Rain fed rice from Casamance boasts average yields of 693 kg/ha, whereas millet from SGB shows the lowest yields with an average of 624 kg/ha. These low yields also indicate that these zones offer considerable potential margins for growth and for the improvement of the living conditions of small cereal farmers.

Limited sales of crops. Considering the share of marketed production, market linkage remains relatively limited. While one third of the production from the Delta is marketed, the Middle Valley only sells 15% of its harvests. In the Groundnut Basin these proportions revolve around 12% and Casamance is far behind with 3 to 6% of output sales. Due to low yields and a small production surplus, households prioritize the satisfaction of their own consumption needs. For this reason, any significant increase in sales will be entirely reliant on progress in productivity. Such an increase is not unattainable if we take into account the possibility of increasing the use of inputs and the implementation of good management practices.

The use of contracts is still limited and revolves around 5%. Contractualization is more common in the SRV, especially in the Delta, although this practice is gaining popularity on small islands of the SGB and in some part of Casamance.

The low number of households having benefited from USAID/PCE interventions (30) in the random sample confirms the relevance of the scaling-up approach, which, if successfully carried out by Naatal Mbay, could contribute significantly to improving the living conditions of rural populations in the target zones.

1. INTRODUCTION

The Feed the Future (FTF) initiative was launched by the American Government through USAID, the agency in charge of International Development. This initiative is being implemented in several countries across the world. Feed The Future Senegal Naatal Mbay is a follow-up to the USAID Economic Growth Project (USAID/PCE) with an implementation timeline planned over 4 years starting from March 2015. This project aims to improve food security, nutrition and economic opportunities for the most vulnerable households living in the area of influence (AI). A consortium led by International Resources Group (IRG), a subsidiary of the Engility Corporation group, is responsible for the implementation.

Naatal Mbay builds on the lessons and achievements of USAID/PCE and the other programs of Feed the Future Senegal in order to scale up the models and approaches designed for the development of cereal value chains for the benefit of the small farmers of the Senegal River Valley (SRV) and the Southern Forest Zone (SFZ). Naatal Mbay, committed to promoting the capacity-building and sustainability process through collaborations with local partners, entrusted the leadership and execution of the mission to IPAR, one of the members of the consortium.

1.1 Study Objectives

The study consists in drawing up the baseline situation of the performance indicators of the Naatal Mbay project in the various value chains and zones targeted. Specifically, it will lead to a better knowledge of the target households, the creation of connections between Project activities and results, and provide the baseline required to eventually describe the impact of the interventions on the evolution of the agricultural sector and the livelihood of rural households. This nationwide study provides the opportunity to generate factual data that could guide decision-making and other initiatives concerning the agricultural sector, food security and the fight against poverty. It was designed to be replicable periodically, independently, and on different scales if necessary, to adapt to important changes over time.

1.2 General Project Overview

Feed the Future Senegal Naatal Mbay is to be deployed in four major technical fields: 1) increasing the productivity of staple cereals (irrigated rice, rain fed rice, maize and millet), 2) strengthening agricultural markets, 3) establishing a general environment that encourages the involvement of the private sector in agricultural development, and 4) building local capacities as an essential condition for efficiency and sustainability. The implementation of the Project is inspired by an approach structured around the farmers and their organizations, which facilitates the adoption of promoted technologies on a large scale while ensuring an easier access to the markets of inputs, services, and cereal productions.

2. METHODOLOGY AND DATA

2.1. Study Population and Geographic Coverage

In order to establish the baseline situation of Feed The Future Senegal Naatal Mbay and to monitor its activities with performance indicators, data is required at two levels: on one hand the households, main beneficiaries of the project, and on the other hand the group of post-harvest actors and organizations that includes processors, Farmers' Organizations (FO), banks and credit institutions, associations of irrigation water users, women's groups, trade and business associations, and grassroots community organizations (GCO) whose vocation is to support households in their economic development.

The statistical population is comprised of all the households in the area of influence of the project. A household is defined as a group of persons, related or not, living together and making common provision of the entirety or part of their resources to meet their basic needs, including accommodation and food. The members of a household usually have meals together and recognize the authority of one person, the head of household (HH).

2.2. Households Sampling Frame

The general population and housing census carried out by ANSD (*Agence nationale de la statistique et de la démographie*) provided the basis to divide the national territory into geographic zones called Census Districts (CD). The average number of households in a CD is 100, i.e. 1000 individuals. It is materialized on a background map. The list of CDs is exhaustive, which makes it an appropriate sampling frame. For this reason, the sampling frame of the baseline study is comprised of the exhaustive lists of CDs identified in the area of influence of the project, i.e. the Senegal River Valley (SRV) and the Southern Forest Zone (SFZ). It is possible to establish the exhaustive list of the households comprising each CD.

The Zone of Influence (ZI) of the project covers 4 agro-ecological entities (Senegal River Valley, Groundnut Basin, Higher Casamance, Middle and Lower Casamance) characterized by different climates, soil types and farming systems. These zones being heterogeneous, it seems appropriate to consider each of them as a separate stratum. This gives each entity the room to be represented accurately in the draw of the sample in order to properly take into account their specificities.

To draw the sample adequately, the Senegal River Zone was divided into two strata based on differences in productivity between West (near the Delta) and East (the Podor-Matam axis). This also gives the opportunity to carry out an analysis that takes into account other potential differences. Similarly, we divided natural Casamance into two (2) sub-zones, Lower Casamance (Ziguinchor) and Higher and Middle Casamance (Sedhiou-Kolda) due to the differences in production systems and populations characteristics.

A two-stage random sampling was carried out for each of the six sub-zones defined. In the first stage, we drew a CD sample representing the primary units. In the second stage, we drew in each CD sampled in the first stage a household sample representing secondary units. For each zone, the CD list served as the sampling frame for the first stage while the list of households of each sampled CD was used as the sampling frame for the second stage.

2.3. Sample Size

The target sample size was established at 2000 households distributed proportionally to the weight of each of the six (6) sub-zones. Within each sub-zone, the sample was spread across the selected CDs. In each sampled CD, we surveyed 10 households selected at random from the list of heads of households or the numbers listed on the CD maps provided by ANSD. At the end, 2071 households spread across 295 CDs were covered, including 21 that are not primarily engaged in farming activities.

2.4. Indicators Calculation Method

The data required to calculate extrapolation coefficients (survey weights) is provided in great part by ANSD during the Census Districts draw. It consists of:

1) The drawing probabilities of the sampled CDs in each stratum, which are equal to the ratio between the sizes of the CDs and the size of the stratum, multiplied by the number of CDs to be drawn;
2) The size of each sampled CD;
3) The number of households actually surveyed in each CD.

The drawing probability of a household is calculated by multiplying the drawing probability of the CD to which it belongs by the drawing probability of the household within this CD. The extrapolation coefficient, or survey weight, is equal to the inverse of the drawing probability.

2.5. Collection Tools and Reporting Units

The questionnaire was designed to provide accurate information on the baseline case of the indicators of the Naatal Mbay project. It includes a "household" module and a "farmer" module. Each module is structured into several sections, each of which treats a specific theme.

- **The household module (HQ) is comprised of sections focusing on the collection of data regarding the social and demographic characteristics of the household, housing, durable goods, the different income sources of the household, the use of financial services and climate data, etc.**

- **The farming production unit module (FPU) focuses on land resources, crop production, the paid workforce, support/counsel from projects/programs, and the access to financial services. This module targets the households with at least one FPU where at least one of the several crops is produced: millet, maize, rain-fed rice or irrigated rice.**

Both modules were administered to the primary contact, usually the head of household. However, this did not prevent interviewers from seeking supplementing information from other household members, in particular from the farmers concerned by the questions.

Table 1: Survey Zones and Sub-Zones1

Zones	Sub-zones
Senegal River Valley (SRV)	Delta (Dagana)
	Middle Valley (Podor-Matam)
Groundnut Basin	Center (Fatick-Kaolack-Kaffrine)
Forest Zone	Lower Casamance (Ziguinchor)
	Higher and Middle Casamance (Kolda-Sédhiou-)

Source: IPAR, Naatal Mbay Baseline Study, 2015

2.6. Surveyor and Supervisor Training

The field team is made up of the supervisors and surveyors recruited according to their education level, language skills in accordance with the survey zone, and experience with this type of work. The training

method relies on a dynamic approach combining presentations of the questionnaire content and practical applications with the tablets. The presentation of the questionnaire reviewed, for each section, the objective, the questions and the manner in which they should be asked in order to receive accurate answers, and the mistakes to avoid. In each training session, the presentation was enriched by the sharing of experiences aiming to highlight the largest variety of scenarios possible and to bring to light the specificities of each zone. Practical sessions with the tablets followed content presentation in order to familiarize the participants with the IT tool and give them a good understanding of the intricacies of the input mask.

In addition to the training workshops, pilot surveys were carried out on households that did not belong to the sample but were located within the area of influence of the Project. All aspects of the collection protocol were simulated to conduct these pilot surveys. At the end, a debriefing session was organized to perfect the understanding of the questionnaire and its administration to the households and to discuss the issues encountered and how to deal with them.

The last step was the data transmission test. After instructions were provided, each surveyor was invited to use the tablet commands designed to transfer the data collected in order to verify their good technical functionality.

2.7. Data Feedback

The data recorded on the tablets was transferred through Internet to a web platform created for this purpose. The mobile technology used is Open Data Kit (ODK). It consists in a suite of tools using mobile devices such as smartphones and/or tablets (operating under Android) to collect data and upload it to an online server. Once data has been collected in the field with ODK Collecte, it can be imported and managed with ODK Aggregate, the server module of the platform. The supervisors of each survey team coordinated data transmission with the assistance of an IT specialist from IPAR in charge of the web platform.

2.8. Quality Control and Data Analysis

Data control happened at different stages. First, several controls were integrated to the input mask with regards to the limit of the range of variables and the filters. Then, before data transfers, the supervisor reviews the whole questionnaire with the surveyor to control the quality of the answers (exhaustiveness, coherence). Quality control checks also covered the structure, clearance and correction of the data files. For the analysis, a grid was developed in collaboration with the Naatal Mbay team and was used as a foundation to produce results in table and chart formats.

2.9. Study Resources

2.9.1. Main Team Composition

The study was carried out by a technical team comprised of the following:

- A statistician whose main tasks were to provide a data collection protocol including sampling, tocontribute to the development of collection tools, to contribute to the training of the surveyors/supervisors, to control data quality, to contribute to data processing and data analysis, and to contribute to the writing of

the study report.

- An IT specialist whose main tasks were to provide a data feedback structure, to create a system for the transfer of data to an online platform, to build input masks for the tablets, to create a data storage server and to supervise data transfers on a daily basis.
- A data analyst whose main tasks were to contribute to the development of collection tools, to train surveyors/supervisors, to contribute to the supervision of data transfers from the field to the storage server, to control data quality, to process and analyze data, to contribute to the development of a data analysis plan, and to contribute to the writing of the study report.
- The Research Supervisor of IPAR was the mission coordinator.

2.9.2. Data Collection Team Composition

Collection data was carried out by ASPRODEB over 15 days, at an average pace of 134 households per day. The workload was 3 questionnaires per day per surveyor, for a team of 45 surveyors and 9 supervisors. The deployment of the surveyors in the field was organized in accordance with the number of households to be surveyed and travel distances.

2.10. Data Collection Review

A sample of 2000 households, to which 90 households, i.e. 4,5%, were added to compensate for potential non-responses (absences, refusal to answer, etc.), was surveyed in the area of influence of the project. At the end of the surveys, 2071 households had been covered, which represents a 99% response rate. The households surveyed were comprised of 2050 farming households and 21 non-farming households. Of all the farming households, 1931 included a farmer having sown at least one of the four target crops.

Map 1: Georeferenced Map of Surveyed Localities

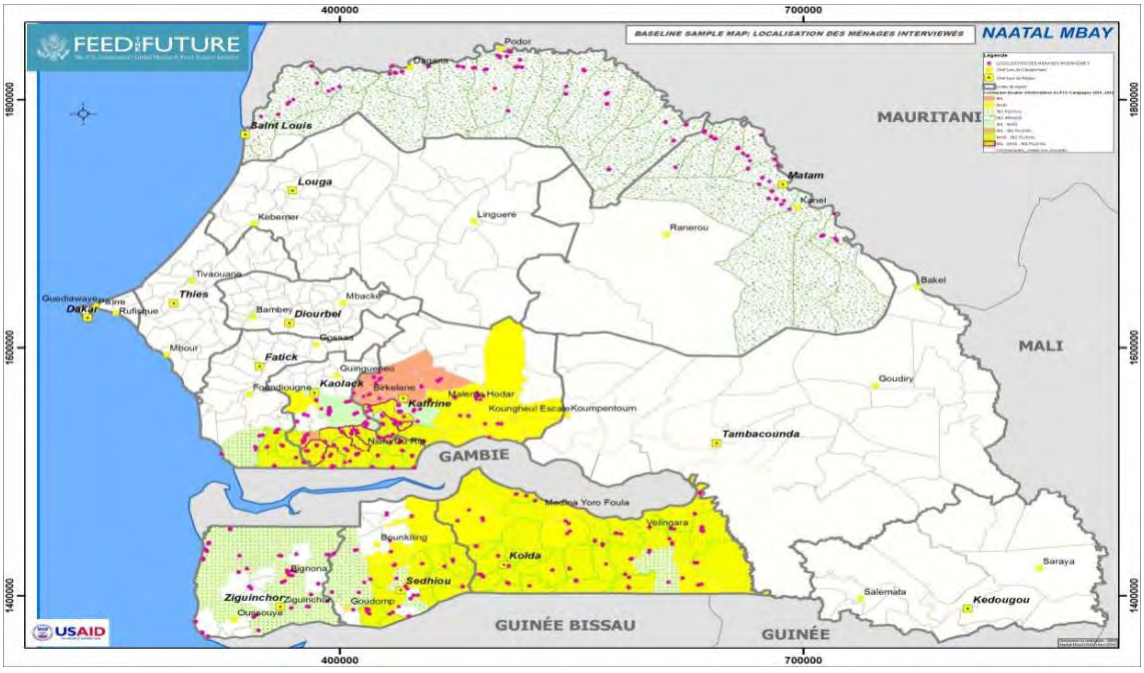


Table 2: Collection Strata and Survey Reviews: Forecasts and Implementation

Zones	Sub-zones	Stratum N°	Expected		Surveyed	
			CD	Nb Households	CD	Nb Households
Senegal River Valley (SRV)	Delta (Dagana)	Strat. 1	12	120	12	120
	Podor-Matam-Kanel	Strat. 2	45	450	43	428
Groundnut Basin	Southern Groundnut Basin (*Fatick -Kaolack-Kaffrine)	Strat> 3	61	610	150	613
Casamance (Casa)	Lower Casamance (Ziguinchor)	Strat> 4	29	290	29	291
	Higher and Middle Casamance (Kolda-Sédhiou)	Strat. 5	62	620	61	619
	TOTAL		209	2 090	295	2 071

* In Fatick, only the department of Foundiougne is covered by the project.
Source: IPAR, Naatal Mbay Baseline Study, 2015

Table 3: Collection Review by Type of Household in each Zone and Sub-Zone

Area of Influence	Strata	Nb Households	Nb Non Farming Households	Nb Farming Households	Nb Value Chain Farming Households
Senegal River Valley (SRV)	Delta (Dagana)	120	11	109	86
	Middle Valley (Podor-Matam–Kanel)	428	6	422	375
Southern Groundnut Basin	Groundnut Basin (Fatick - Kaolack-Kaffrine)	613	0	613	604
Casamance (Casa)	Lower Casamance (Ziguinchor)	291	3	288	265
	Higher and Middle Casamance (Kolda-Sédhiou)	619	1	618	601
	TOTAL	2071	21	2050	1931

Source: IPAR, Naatal Mbay Baseline Study, 2015

2.11. Data Analysis Options

Considering the intervention options of the project in specific zones and for targeted value chains, it is necessary to introduce the general situation of each zone.

Table 4: Distribution of Targeted Crops in Areas of Influence

Areas of Influence	Households having grown...					
	Total value chain households	Irrigated rice HOS	Irrigated rice rainy season	Rain-fed rice	Maize	Millet

	Number	Number	Number	Number	Number	Number
Senegal River Valley (SRV)	461	141	176	3	58	147
Southern Groundnut Basin (SGB)	604	-	9	10	353	578
Casamance (Casa)	866	-	23	480	505	476
Total	1931	141	208	493	916	1 201

Source: IPAR, Naatal Mbay Baseline Study, 2015

The table above is repeated with additional details about the corresponding administrative districts of the agro-ecological zones in order to provide a more nuanced reading of the data.

Table 5: Distribution of Targeted Crops in Administrative Districts

Areas of Influence	Administrative Districts	Households having grown...				
		Irrigated rice HOS	Irrigated rice rainy season	Rain-fed rice	Millet	Maize
		Size	Size	Size	Size	Size
Senegal River Valley (SRV)	Saint-Louis	128	113	0	22	7
	Matam	13	63	3	125	51
Southern Groundnut Basin (SGB)	Kaolack	0	0	4	297	174
	Kaffrine	0	0	0	213	143
	Fatick	0	9	6	67	35
Casamance (Casa)	Ziguinchor	0	15	194	83	57
	Sédhiou	0	3	192	161	148
	Kolda	0	5	94	232	300

Source: IPAR, Naatal Mbay Baseline Study, 2015

Hot Off Season irrigated rice and Rainy Season irrigated rice are both essentially produced in the Senegal River Valley. In certain parts of this report, in particular the ones on technologies, the SRV has been split into two sub-zones according to the strata used in the sampling, in order to refine the analysis and highlight a few major differences within the framework of the project. These sub-zones are the Delta, and more precisely the district of Dagana, and the Middle Valley, with the districts of Podor and Matam.

Where rain-fed rice is concerned, the data also confirms that this crop is grown in Casamance mainly, and in the Southern Groundnut Basin (SGB). Due to the significant difference between those two zones, each of them will be analyzed separately.

Considering the small number of households in the SGB-Rain-fed rice zone (10 households), the result of this zone will be provided for information purposes only and will not be taken into account in the analysis. In the case of maize, because the project has chosen to intervene in the Southern Groundnut Basin and in Casamance, the analysis will not take into account the Senegal River Valley for this crop in spite of its relatively significant weight.

Similarly, millet will only be analyzed in the Southern Groundnut Basin in spite of a strong presence in the Senegal River Valley and Casamance.

Results with a size below 15 will not be listed.

3. GENERAL HOUSEHOLD CHARACTERIZATION

3.1. Gender of Household Heads

The household heads of the sample are men in majority (95%), women making up only 5% of the number (see table below). This distribution is relatively similar in all the zones but varies depending on the targeted value chains. A few distinctive cases can be noted, especially for SGB-Maize where 1% of household heads are women. These results are in accordance with most of the studies conducted in Senegal and have sociological roots.

Table 6: Distribution of Households According to Gender of Household Head

	Total sample		[SRV] – Irrigated rice		[Casa] - Rainfed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
Man	1841	95%	277	97%	442	92%	349	99%	490	97%	557	96%
Woman	90	5%	9	3%	38	8%	4	1%	15	3%	21	4%
Total	1931	100%	286	100%	480	100%	353	100%	505	100%	578	100%

Source: IPAR, Naatal Mbay Baseline Study, 2015

3.2. Household Types

The table below shows that the majority of household types (97%) are comprised of "adult men and women" across the entirety of the sample. This trend remains similar in all zones according to the value chain targeted. Households with "adult man only" or "adult woman only" exist in very small proportions in all the zones and are generally seen as vulnerable.

Table 7: Distribution of Household Types

Types of Households	Total sample		[SRV] – Irrigated rice		[Casa] - Rainfed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
Adult men only	29	2%	3	1%	13	3%	1	0%	8	2%	7	1%
Adult women only	23	1%	2	1%	8	2%	3	1%	6	1%	6	1%
Adult men and women	1879	97%	281	98%	459	96%	349	99%	491	97%	565	98%
Total	1931	100%	286	100%	480	100%	353	100%	505	100%	578	100%

Source: IPAR, Naatal Mbay Baseline Study, 2015

3.3. Poverty Level

Sections D and E of the questionnaire focusing on housing characteristics and the inventory of durable goods in the household derive from the PAT (Poverty Assessment Tool) developed by USAID. This tool is used to assess the poverty level of the population in countries where the American Government provides support. The PAT establishes the poverty threshold at US$1.25 or CFAF421.93 in purchasing power parity (PPP) of year 2009 for Senegal. This threshold is the equivalent of the one adopted at an international level, including by the World Bank. With this threshold, any household living with less than US$1.25 per day is categorized as "very poor", while any household living with more than US$2.5 per day is "not poor".

The table below shows that 53.2% of the sample households live with less than US$1.25 per day, which places them in the "very poor" category. This percentage is corroborated by the result of the poverty monitoring study of 2011 (*Enquête de suivi de la pauvreté au Sénégal* or ESPS II), which estimates the incidence of poverty in rural areas at 57.1% within a confidence interval of [53,5% - 60,1%] to 95%. However, it should be noted that calculation methods vary and the coverage area of the study is different from the one in ESPS II, which might explain the discrepancy observed.

The percentage of "very poor" hides variations between zones and targeted value chains: 32.9% for SRV-Irrigated rice, 67.3% for Casa-Rain-fed rice, 41.6% and 80.2% for SGB-Maize and Casa-Maize respectively. In the case of SGB-Millet, the percentage of "very poor" households comprises a little more than a third (34.8%) of the households.

Households living with an amount of money ranging between US$1.25 and US$2.5 per day and categorized as "poor" make up for 43.1% of the sample. This US$1.25 and US$2.5 range holds the majority of the households, except in the case of Casa-Rain-fed rice (30.6%) and Casa-Maize (19.0%), where the "very poor" category is dominant.

The analysis by gender of the household heads based on the table below reveals that at the scale of the sample, the percentage of "very poor" male household heads (53.9%) is higher than the percentage of "very poor" female household heads (38.9%). The same situation can be observed in all the zones by value chain. This trend is reversed in the category of "poor" households, where at the scale of the sample and in all zones except SGB-Maize, the percentages of "poor" household heads is lower for men than for women. However, these comparisons must be put into perspective, as the small number of female household heads is not significant in many zones.

Table 8: Household Poverty Level According to USAID PAT with a US$ 1,25 threshold (PPA, 2009)

		Total sample		[SRV] – Irrigated rice		[Casa] - Rainfed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
		Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
Total	Very Poor	1028	53,2%	94	32,9%	323	67,3%	147	41,6%	405	80,2%	201	34,8%
	Poor	833	43,1%	172	60,1%	147	30,6%	189	53,5%	96	19,0%	352	60,9%
	Not Poor	70	3,6%	20	7,0%	10	2,1%	17	4,8%	4	0,8%	25	4.3%
	Total	1931	100,0%	286	100,0%	480	100,0%	353	100,0%	505	100,0%	578	100,0%

Male HH	Very Poor	993	53,9%	92	33,2%	304	68,8%	146	41,8%	397	81,0%	198	35,5%
	Poor	782	42,5%	165	59,6%	129	29,2%	187	53,6%	89	18,2%	336	60,3%
	Not Poor	66	3,6%	20	7,2%	9	2,0%	16	4,6%	4	0,8%	23	4,1%
	Total	1841	100,0%	277	100,0%	442	100,0%	349	100,0%	490	100,0%	557	100,0%
Fem HH	Very Poor	35	38,9%	2	22,2%	19	50,0%	1	25,0%	8	53,3%	3	14.3%
	Poor	51	56,7%	7	77,8%	18	47,4%	2	50,0%	7	46,7%	16	76,2%
	Not Poor	4	4,4%	0	0,0%	1	2,6%	1	25,0%	0	0,0%	2	9,5%
	Total	90	100,0%	9	100,0%	38	100,0%	4	100,0%	15	100,0%	21	100,0%

* CFAF 421.92 = US$ 1.25 PPP of the year 2009
Very Poor (Consumption < CFAF 421.92/day)
Poor (CFAF 421.92/day < Consumption < CFAF 843.84/day)
Not Poor (Consumption > CFAF 843.84/day)
Source: IPAR, Naatal Mbay Baseline Study, 2015

Box: Poverty threshold established at US$1.90 instead of US$1.25

Using a US$1.9 poverty threshold as the World Bank does in its latest reports on poverty, the daily minimum consumption required in Senegal to be categorized as "not poor" is now CFAF 641.3 (PPP of 2009). With a US$1.9 threshold, the percentage of "very poor" households is 87.6% within the sample, while across all zones, "very poor" households now constitute the majority, which was not the case with a US$1.25 threshold.

By comparing household heads according to gender, the results of the following table show that across the sample, the percentage of "very poor" household heads is higher for men than for woman. Overall, this trend can also be observed in all the zones except SRV-Irrigated rice. As for the "poor" category, there is no general trend across all zones, even though within the sample, the percentage of male household heads (10.6%) is lower than the percentage of female household heads (21.1%). One again, these results must be put into perspective due to the fact that the numbers of female household heads are high enough to be significant in many zones.

Table 9: Household Poverty Level According to USAID PAT with a US$1.9 threshold (PPA, 2009)9

		Total sample		[SRV] – Irrigated rice		[Casa] - Rainfed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
		Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
Total	Very Poor	1692	87,6%	210	73,4%	455	94,8%	304	86,1%	497	98,4%	475	82,2%
	Poor	215	11,1%	70	24,5%	22	4,6%	44	12,5%	6	1,2%	95	16,4%
	Not Poor	24	1,2%	6	2,1%	3	0,6%	5	1,4%	2	0,4%	8	1,4%
	Total	1931	100,0%	286	100,0%	480	100,0%	353	100,0%	505	100,0%	578	100,0%
Male HH	Very Poor	1621	88,0%	203	73,3%	423	95,7%	302	86,5%	484	98,8%	461	82,8%
	Poor	196	10,6%	68	24,5%	16	3,6%	42	12,0%	4	0,8%	88	15,8%
	Not Poor	24	1,3%	6	2,2%	3	0,7%	5	1,4%	2	0,4%	8	1,4%
	Total	1841	100,0%	277	100,0%	442	100,0%	349	100,0%	490	100,0%	557	100,0%

Fem HH	Very Poor	71	78,9%	7	77,8%	32	84,2%	2	50,0%	13	86,7%	14	66,7%
	Poor	19	21,1%	2	22,2%	6	15,8%	2	50,0%	2	13,3%	7	33,3%
	Not Poor	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%	0	0,0%
	Total	90	100,0%	9	100,0%	38	100,0%	4	100,0%	15	100,0%	21	100,0%

* CFAF 641.3 = US$ 1.9 PPP of 2009
Very Poor (Consumption < CFAF 641.3/day)
Poor (CFAF 641.3/day < Consumption < CFAF 1,282.6/day)
Not Poor (Consumption > CFAF 1,282.6/day)
Source: IPAR, Naatal Mbay Baseline Study, 2015

3.4. Weight of Agriculture in Household Revenue

We observe that 81% of the sample households are dependent on farming revenues for over 50% or more of their income. A similar trend and similar proportions are reported across all zones, with slight variations according to the value chain.

Table 10: Average Income Share of Farming in Total Household Income

	Total sample		[SRV] – Irrigated rice		[Casa] - Rainfed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
	*Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
< 50%	355	18%	55	19%	96	20%	41	12%	68	13%	82	14%
50% to 75%	779	40%	121	42%	157	33%	204	58%	138	27%	325	56%
> 75%	797	41%	110	38%	227	47%	108	31%	299	59%	171	30%
Total	1931	100%	286	100%	480	100%	353	100%	505	100%	578	100%

*Nb = number

Source: IPAR, Naatal Mbay Baseline Study, 2015

These results confirm the major weight of agriculture in the overall income of the households across all selected zones and crops, and for both men and women. Besides farming, the other relatively important income sources across the whole sample are livestock (7%), money transfers from migrants (5%), craftsmanship (3%), and wages (3%). The other income sources reported in the sample, such as fishing and transportation, do not exceed 2% of the total income of households. Similar trends are observed in the various zones according to the targeted crops and the gender of the household head.

Table 11: Income Shares of Different Sources in Total Household Income by Zone and by Gender of Household Head

	Farming	Livestock Keeping	Fishing	Hunting and Gathering	Craft Trades	Transport ation	Wages	Transfers	Others
	% in line								
Male HH	67%	7%	1%	0%	3%	1%	3%	4%	13%

Total sample	Fem HH	66%	3%	2%	1%	1%	2%	3%	7%	15%
	Total HH	67%	7%	2%	0%	3%	1%	3%	5%	13%
[SRV] – Irrigated rice	Male HH	64%	15%	2%	0%	2%	1%	3%	6%	9%
	Fem HH	70%	6%	3%	0%	0%	0%	1%	10%	10%
	Total HH	64%	14%	2%	0%	2%	1%	3%	6%	9%
[Casa] - Rainfed rice	Male HH	70%	4%	3%	1%	3%	1%	5%	3%	11%
	Fem HH	67%	2%	1%	2%	2%	3%	3%	4%	17%
	Total HH	70%	4%	3%	1%	3%	1%	5%	3%	11%
[SGB] - Maize	Male HH	66%	8%	0%	0%	2%	1%	2%	3%	18%
	Fem HH	65%	8%	3%	0%	0%	0%	0%	5%	20%
	Total HH	66%	8%	0%	0%	2%	1%	2%	4%	18%
[Casa] - Maize	Male HH	75%	5%	1%	0%	2%	0%	3%	4%	10%
	Fem HH	66%	3%	0%	0%	0%	0%	10%	3%	19%
	Total HH	75%	4%	1%	0%	2%	0%	3%	4%	10%
[SGB] - Millet	Male HH	65%	7%	0%	0%	3%	2%	2%	3%	17%
	Fem HH	63%	2%	5%	0%	1%	2%	1%	5%	20%
	Total HH	65%	7%	0%	0%	3%	2%	2%	3%	18%

Source: IPAR, Naatal Mbay Baseline Study, 2015

3.5. Households Benefiting from Project Support

According to the following table, 84.6% of the sample households declare not to have benefited from the support of any project. The ones having benefited from USAID/PCE support make up 1.6% of the sample. The percentage of USAID/PCE beneficiaries varies between 0.7% and 4.0% depending on the zone and value chain targeted: 0.7% for SRV-Irrigated rice, 0.8% for Casa-Rain-fed rice, 4% and 1.4% for SGB- Maize and Casa-Maize respectively, and 3.3% for SGB-Millet.

The low number of USAID/PCE reported beneficiaries might be due to the fact that the project focused more on "soft" interventions such as coaching and capacity-building, as opposed to other projects providing direct assistance by granting physical goods such as production inputs.

Table 12: Households Benefiting from Project Support

Project support?		Total sample		[SRV] – Irrigated rice		[Casa] - Rainfed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
		Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
None	No	298	15,4%	40	14,0%	79	16,5%	87	24,6%	85	16,8%	116	20,1%
	Yes	1633	84,6%	246	86,0%	401	83,5%	266	75,4%	420	83,2%	462	79,9%
PCE	No	1901	98,4%	284	99,3%	476	99,2%	339	96,0%	498	98,6%	559	96,7%
	Yes	30	1,6%	2	0,7%	4	0,8%	14	4,0%	7	1,4%	19	3,3%
CLUSA	No	1914	99,1%	285	99,7%	479	99,8%	342	96,9%	503	99,6%	564	97,6%
	Yes	17	0,9%	1	0,3%	1	0,2%	11	3,1%	2	0,4%	14	2,4%
PAFA	No	1897	98,2%	285	99,7%	479	99,8%	329	93,2%	503	99,6%	549	95,0%
	Yes	34	1,8%	1	0,3%	1	0,2%	24	6,8%	2	0,4%	29	5,0%
Other	No	1694	87,7%	247	86,4%	404	84,2%	306	86,7%	426	84,4%	512	88,6%
	Yes	237	12,3%	39	13,6%	76	15,8%	47	13,3%	79	15,6%	66	11,4%

Source: IPAR, Naatal Mbay Baseline Study, 2015

3.6. Household Size

Sample households count an average of 15 members. On average, male household heads have larger households (15 to 16 members) than female household heads (11) and this trend can be observed across all zones and value chains targeted.

Table 13: Average Household Size and Age of Household Heads

		Size household				Age of household head			
		Mean	Std dev.	Min	Max	Mean	Std dev.	Min	Max
Total sample	Male HH	15,6	7,9	1,0	50,0	52,9	13,2	19,0	95,0
	Fem HH	11,0	5,6	2,0	25,0	52,6	10,3	30,0	77,0
	Total HH	15,4	7,9	1,0	50,0	52,9	13,1	19,0	95,0
[SRV] – Irrigated rice	Male HH	14,9	7,9	1,0	47,0	55,4	11,7	28,0	90,0
	Fem HH	13,9	4,3	7,0	19,0	48,7	10,6	30,0	64,0
	Total HH	14,8	7,8	1,0	47,0	55,2	11,7	28,0	90,0
[Casa] - Rainfed rice	Male HH	14,5	7,6	4,0	50,0	53,5	13,5	19,0	95,0
	Fem HH	9,6	5,2	2,0	21,0	53,4	11,2	30,0	77,0
	Total HH	14,2	7,5	2,0	50,0	53,5	13,4	19,0	95,0
[SGB] - Maize	Male HH	17,4	7,8	2,0	48,0	51,3	12,7	23,0	93,0
	Fem HH	10,3	7,1	4,0	19,0	52,5	9.5	40,0	63,0
	Total	17,3	7,8	2,0	48,0	51,3	12,6	23,0	93,0
[Casa] - Maize	Male HH	15,8	8,2	3,0	50,0	51,7	13,6	19,0	90,0
	Fem HH	9,1	4,1	2,0	16,0	51,3	10,1	33,0	70,0
	Total HH	15,6	8,2	2,0	50,0	51,7	13,5	19,0	90,0
[SGB] - Millet	Male HH	15,8	7,6	2,0	48,0	50,9	12,9	22,0	93,0
	Fem HH	10,1	5,3	4,0	23,0	52,0	10,0	38,0	76,0
	Total HH	15,6	7,6	2,0	48,0	50,9	12,8	22,0	93,0

Source: IPAR, Naatal Mbay Baseline Study, 2015

3.7. Household Composition by Age Category and Gender

It can be noticed that adults between 15 and 64 years old are the biggest category found in the households, with a slight difference between men (25.5%) and women (24.2%). Children between 6 and 14 years old follow in second position, with a slightly higher proportion of boys (14.8%) compared to girls (13.2%). In third place can be found children between 0 and 5 years old, also with a slightly higher percentage of boys (8.8%) over girls (8.3%). Individuals over 64 years old are the least represented category in the households, with a nearly equal proportion of men and women, 2.7% and 2.6% respectively.

Men-led households and woman-led households share a very similar structure, with variations ranging from 1% to 3% depending on the age category. The trends recorded across the sample are similar to the ones observed by zone and crop, with minor particularities in a few cases. Where Casa-Rain-fed rice is concerned, girls (15.2%) are in higher numbers than boys (9.1%).

Table 14: Household Structure by Gender and Age Category

Household composition (% line)		Size (N)	Adults > 64 y.o.		Adults 15-64 y.o.		Children 6-14 y.o.		Children 0-5 y.o.	
			Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.
Total sample	Male HH	1841	2,7%	2,6%	25,4%	24,0%	14,9%	13,2%	8,9%	8,4%
	Fem HH	90	1,9%	3,3%	27,8%	27,9%	12,2%	12,8%	7,2%	7,0%
	Total HH	1931	2,7%	2,6%	25,5%	24,2%	14,8%	13,2%	8,8%	8,3%
[DELTA] – Irrigated rice	Male HH	83	3,8%	3,2%	28,5%	29,5%	13,2%	12,4%	4,4%	5,0%
	Fem HH	3	6,8%	6,8%	21,5%	26,6%	16,3%	11,8%	2,6%	7,5%
	Total HH	86	3,9%	3,4%	28,2%	29,4%	13,3%	12,4%	4.3%	5,1%
[IMiddle Valley] – Irrigated rice	Male HH	194	2,5%	3,1%	24,9%	24,1%	14,1%	13,8%	9,0%	8,6%
	Fem HH	6	0,0%	1,9%	29,0%	30,4%	20,1%	8,5%	6,1%	4,1%
	Total HH	200	2,5%	3,0%	25,0%	24,2%	14.3%	13,6%	8,9%	8,5%
[Casa] - Rainfed rice	Male HH	442	2,7%	2,5%	26,8%	24,1%	15,2%	12,2%	8,6%	8,0%
	Fem HH	38	3,0%	4,0%	29,0%	27,2%	9,1%	13,3%	6,5%	7,9%
	Total HH	480	2,7%	2,6%	27,0%	24,4%	14,7%	12,3%	8,4%	8,0%
[SGB] - Maize	Male HH	349	2,5%	2,3%	23,8%	23,6%	15,6%	13,4%	10,2%	8,6%
	Fem HH	4	0,0%	0,0%	34,8%	24,8%	9,6%	16,4%	5,3%	9,1%
	Total HH	353	2,5%	2,3%	23,9%	23,7%	15,5%	13,4%	10,1%	8,6%
[Casa] - Maize	Male HH	490	2,5%	2,0%	24,8%	23,7%	14,9%	13,2%	9,5%	9,4%
	Fem HH	15	0,0%	3,1%	23,5%	39,3%	9,5%	12,0%	8,8%	3,7%
	Total HH	505	2,4%	2,1%	24,7%	24,2%	14,8%	13,2%	9,5%	9,2%
[SGB] - Millet	Male HH	557	2,7%	2,4%	24,2%	23,2%	15,7%	13,2%	9,7%	8,8%
	Fem HH	21	0,0%	2,7%	26,9%	24,4%	16,1%	13,2%	9,4%	7,3%
	Total HH	578	2,6%	2,4%	24,3%	23,3%	15,7%	13,2%	9,7%	8,7%

Source: IPAR, Naatal Mbay Baseline Study, 2015

3.8. Education Level of Household Heads and Members

Education Level of Other Household Members

In total, 57% of household members have received school education. This proportion is higher in the women-led households (62%). We observe that household members having attended Koranic/Arabic school are present in higher numbers (14% for men and 10% for women) in comparison to the other types of education.

The percentage of educated individuals decreases as the education level increases. 10% of the men and 9% of the women have primary school education while 6% and 4% respectively have secondary school education,

and finally, 1% and 0% respectively have higher education level.

Table 15: Education Level of Household Numbers by Gender of Household Members and Household Head (% line)

Table 16: Education Level of Household Members (% line)		Literate in national language		Koranic/Arabic school		Primary school		Secondary school		Higher education		% Total educated
		Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	
Total sample	Male HH	1%	2%	15%	10%	10%	9%	6%	4%	1%	0%	57%
	Fem HH	0%	2%	9%	8%	10%	11%	12%	7%	2%	0%	62%
	Total HH	1%	2%	14%	10%	10%	9%	6%	4%	1%	0%	57%
[SRV] – Irrigated rice	Male HH	1%	1%	13%	6%	9%	10%	6%	7%	1%	0%	55%
	Fem HH	3%	1%	13%	4%	6%	4%	5%	5%	1%	0%	42%
	Total HH	2%	1%	13%	6%	9%	10%	6%	7%	1%	0%	55%
[Casa] - Rainfed rice	Male HH	1%	1%	8%	6%	15%	11%	11%	6%	1%	0%	61%
	Fem HH	0%	1%	5%	6%	12%	15%	12%	10%	3%	1%	66%
	Total HH	1%	1%	8%	6%	15%	12%	11%	6%	1%	0%	61%
[SGB] - Maize	Male HH	1%	2%	22%	19%	7%	6%	3%	2%	1%	0%	62%
	Fem HH	0%	0%	7%	9%	0%	6%	16%	13%	5%	0%	57%
	Total HH	1%	2%	22%	18%	7%	6%	3%	2%	1%	0%	62%
[Casa] - Maize	Male HH	1%	2%	13%	8%	12%	10%	7%	4%	1%	0%	56%
	Fem HH	0%	2%	7%	7%	9%	13%	14%	10%	0%	0%	63%
	Total HH	1%	2%	12%	8%	12%	10%	7%	4%	1%	0%	56%
	Male HH	1%	2%	23%	18%	7%	6%	3%	2%	1%	0%	62%
Table 16: Education Level of Household Members (% line)		Literate in national language		Koranic/Arabic school		Primary school		Secondary school		Higher education		% Total educated
		Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	
[SGB] - Millet	Fem HH	0%	2%	15%	18%	6%	5%	13%	4%	1%	0%	66%
	Total HH	1%	2%	23%	18%	7%	6%	3%	2%	1%	0%	62%

Source: IPAR, Naatal Mbay Baseline Study, 2015

Education of Household Heads

We observed that across the total sample, half of the household heads (50%) attended Koranic/Arabic school. Household heads with a primary school level (14%) arrive in second place. Household heads with a higher level of education comprise 2% of the sample. The percentages of educated household heads are higher for men than for women, with the exception of literacy in a national language (4% of the men vs. 11% of the women) and secondary school (7% of the men vs. 8% of the women). Koranic/Arabic school is attended by a significantly bigger proportion of men with 52% of male household heads against 28% of female household heads.

Table 16: Education Level of Household Heads (line %)

Education of Household Heads (line %)		None	Literate in national language	Koranic/Arabic school	Primary school	Secondary school	Higher education	Other
Total sample	Male HH	21%	5%	52%	14%	7%	2%	0%
	Fem HH	41%	11%	28%	11%	8%	1%	0%
	Total HH	21%	5%	50%	14%	7%	2%	0%
[SRV] – Irrigated rice	Male HH	29%	13%	39%	13%	5%	1%	0%
	Fem HH	56%	22%	11%	11%	0%	0%	0%
	Total HH	30%	13%	38%	13%	5%	1%	0%
[Casa] - Rainfed rice	Male HH	24%	2%	31%	24%	15%	2%	0%
	Fem HH	42%	8%	29%	11%	8%	3%	0%
	Total HH	26%	3%	31%	23%	15%	3%	0%
[SGB] - Maize	Male HH	6%	3%	80%	8%	4%	1%	0%
	Fem HH	50%	0%	50%	0%	0%	0%	0%
	Total HH	6%	3%	79%	8%	4%	1%	0%
[Casa] - Maize	Male HH	27%	6%	44%	16%	6%	1%	0%
	Fem HH	27%	7%	33%	20%	13%	0%	0%
	Total HH	27%	6%	44%	16%	6%	1%	0%
[SGB] - Millet	Male HH	7%	3%	76%	9%	4%	1%	0%
	Fem HH	24%	5%	57%	10%	5%	0%	0%
	Total HH	7%	3%	76%	9%	4%	1%	0%

Source: IPAR, Naatal Mbay Baseline Study, 2015

3.9. Primary Activities of Household Heads

Farming is the main activity of the majority of household heads in all zones for both men and women, with percentages ranging from 80% to 100% in some zones depending on the crop. Other primary activities are under-represented.

Table 17: Main Activities of Household Heads (line %)

Main Activities of Household Head (line %)		Farming/ Livestock Keeping/ Fishing	Craft Trades	Transportation	Workers/ Laborers	Civil Servant/ Middleman/ Employees	Liberal Profession	Business/ Sales	Retirees	Inactive/ Unemployed	Other
Total sample	Male HH	91%	2%	0%	1%	1%	1%	2%	0%	0%	1%
	Fem HH	93%	1%	0%	0%	0%	0%	2%	1%	1%	1%
	Total HH	91%	2%	0%	1%	1%	1%	2%	0%	0%	1%

[SRV] – Irrigated rice	Male HH	94%	2%	0%	0%	1%	0%	1%	0%	0%	1%
	Fem HH	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Total HH	94%	2%	0%	0%	1%	0%	1%	0%	0%	1%
[Casa] - Rainfed rice	Male HH	90%	1%	0%	2%	2%	1%	2%	0%	0%	1%
	Fem HH	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Total HH	91%	1%	0%	2%	2%	1%	1%	0%	0%	1%
[SGB] - Maize	Male HH	93%	1%	0%	1%	0%	1%	3%	0%	0%	1%
	Fem HH	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Total HH	93%	1%	0%	1%	0%	1%	3%	0%	0%	1%
[Casa] - Maize	Male HH	93%	1%	0%	2%	1%	1%	1%	0%	0%	1%
	Fem HH	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Total HH	93%	1%	0%	2%	1%	1%	1%	0%	0%	1%
[SGB] - Millet	Male HH	91%	2%	1%	1%	0%	1%	3%	0%	0%	1%
	Fem HH	81%	0%	0%	0%	0%	0%	10%	5%	0%	5%
	Total HH	91%	2%	1%	1%	0%	1%	3%	0%	0%	1%

Source: IPAR, Naatal Mbay Baseline Study, 2015

4. PRODUCTION PROFILE OF FARMING HOUSEHOLDS

Out of all the agricultural production factors, land is particularly essential. This section of the report will focus on the descriptive analysis of the land resources of households in target zones in terms of numbers of parcels and types of land tenures available to the farmers. The land resources taken into account are the ones held by the households that include at least one farmer involved in one of the value chains targeted.

4.1. Land Resources

Nearly all parcels owned by the households are comprised of land under rain-fed crops. Indeed, SRV households excluded, more than nine out of ten household-owned parcels in the other zones are dedicated to rain-fed crops. SRV households set themselves apart with their high proportion of irrigated lands (90%). However, it should be noted that SRV households own 6% of "rain-fed land" parcels, while the households of the rain-fed rice value chain in the SGB also own 6% of "irrigated land" parcels.

Farming operations are relatively small in light of the number of parcels or areas sown. On average, households farm less than three parcels (2-3), for a total area that does not exceed 4 ha. Women-led households sow a slightly smaller number of parcels and smaller areas than the ones with a male household head. This gap is even more accentuated for maize and millet in all concerned zones.

Table 18: Distribution of Household Parcels by Parcel Type

	Total sample			[SRV] – Irrigated rice			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Parcel type (column %)																		
Irrigated land	8%	13%	8%	90%	94%	90%	0%	6%	1%	0%	0%	0%	0%	4%	0%	1%	2%	1%
Rain-fed land	89%	85%	89%	6%	6%	6%	92%	89%	92%	97%	100%	97%	97%	96%	97%	97%	94%	97%
Lowland	2%	2%	2%	2%	0%	2%	7%	4%	7%	1%	0%	1%	2%	0%	2%	1%	2%	1%
Other	1%	1%	1%	1%	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%	0%	1%	3%	1%

Source: IPAR, Naatal Mbay Baseline Study, 2015

The analysis of the table below reveals that nearly all the parcels used by farmers belong either to themselves (49%) or their family (43%). The irrigated rice value chain presents a slightly different situation, with 41% of the parcels being individual properties and 45% being family property, while other types of ownership make up 10% of the sample. This configuration might lead to believe that overall, farmers experience fewer constraints when it comes to land acquisition. However, it could be masking wide internal disparities and the imperfections of the land market (few or no land transactions).

Table 19: Distribution of Household Parcels by Type of Ownership

	Total sample			[SRV] – Irrigated rice			[Casa] - Rainfed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Type of ownership (column %)																		
Individual	50%	42%	49%	42%	19%	41%	47%	32%	46%	41%	38%	41%	59%	62%	59%	40%	49%	40%
Family	42%	51%	43%	44%	81%	45%	47%	57%	48%	48%	63%	49%	36%	34%	36%	49%	41%	49%
Collective (outside family)	3%	5%	3%	4%	0%	4%	3%	9%	3%	4%	0%	4%	1%	4%	1%	5%	5%	5%
Other	5%	4%	5%	10%	0%	10%	2%	2%	2%	7%	0%	7%	4%	0%	4%	7%	5%	7%

Source: IPAR, Naatal Mbay Baseline Study, 2015

The table below shows that 90% of the parcels operated under owner-occupancy, which means that they are farmed by their owners. This percentage is higher for SGB rain-fed rice (94%) and Casamance maize (95%), where nearly all parcels are farmed by their owners. In the SRV, however, this proportion is slightly smaller (84%). Generally, parcels under a tenant-farming or sharecropping agreement constitute a relatively minor percentage (7% on average).

Men-led households and women-led households have different levels of tenant-farming and sharecropping. For tenant-farming, across the sample, the percentage of female household heads (8%) is higher than the percentage of male households heads (5%), but this trend is not uniform across all zones. Where sharecropping is concerned, the percentage of male household heads is bigger than the one for female household heads in every zone.

Table 20: Distribution of Parcels by Mode of Operation and Crop

	Total sample			[SRV] – Irrigated rice			[Casa] - Rainfed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Operation Mode (column %)																		
Owner occupancy	90%	90%	90%	84%	88%	84%	92%	83%	91%	84%	100%	84%	95%	98%	95%	84%	90%	85%
Tenant farming	5%	8%	5%	4%	0%	4%	5%	15%	6%	11%	0%	11%	1%	2%	1%	10%	8%	10%
Sharecropping	2%	1%	2%	3%	0%	3%	2%	0%	2%	2%	0%	2%	1%	0%	1%	3%	2%	3%
Others	3%	2%	3%	9%	13%	9%	1%	2%	1%	2%	0%	2%	2%	0%	2%	3%	0%	3%

Source: IPAR, Naatal Mbay Baseline Study, 2015

4.2. Crop Types

The main crops grown vary according to the zone. In number of parcels, groundnut comes first (29%), followed by millet (24%), maize (17%), and rain-fed rice (11%). Zone by zone, this hierarchy changes completely. In the Southern Groundnut Basin, the most frequent crops in the parcels of this sub-zone remain groundnut (43%), followed by millet (32%) and maize (18%). In Casamance, however, after groundnut which remains the most grown crop (24%), rain-fed rice comes second with 21% of the parcels, followed by millet and maize, which both occupy 18% of the parcels. In the SRV – rainy season and hot off-season combined – the crop with the strongest presence is rice, with 53% of the parcels including 28% in the rainy season and 25% during the hot off-season. Millet and cowpea come in second and third place with respectively 28% and 16% of the parcels.

Table 21: Distribution of the Number of Plots Sown by Type of Crop and Zone

	SRV		SGB		Casamance		Total sample	
	Number	column %	Number	column %	Number	column %	Number	column %
Groundnut	41	6%	917	43%	702	24%	1660	29%
Millet	183	28%	679	32%	516	18%	1378	24%
Maize	72	11%	376	18%	533	18%	981	17%
Rain-fed rice	3	0%	13	1%	620	21%	636	11%
Irrigated rice RS	182	28%	9	0%	32	1%	223	4%
Irrigated rice HOS	163	25%	0	0%	0	0%	163	3%
Sorghum	41	6%	51	2%	76	3%	168	3%
Cowpea	101	16%	14	1%	69	2%	184	3%
Sesame	0	0%	26	1%	87	3%	113	2%
Cotton	0	0%	1	0%	105	4%	106	2%
Watermelon	29	4%	15	1%	15	1%	59	1%

Onion	45	7%	10	0%	1	0%	56	1%
Bissap	18	3%	7	0%	4	0%	29	1%
Fonio	0	0%	0	0%	25	1%	25	0%
Tomato	15	2%	5	0%	3	0%	23	0%
Fallow land	12	2%	47	2%	131	5%	190	3%
Total	648	100%	2144	100%	2892	100%	5684	100%

Source: IPAR, Naatal Mbay Baseline Study, 2015

In the SRV-Delta as in the SRV-Middle Valley, irrigated rice occupies 94.5% of the areas sown by farming households. In Casamance, rain-fed rice and maize occupy respectively 44.5% and 29.4% of the areas sown. In the SGB, maize and millet are grown over 16% and 36.6% respectively of the areas sown. Globally households use nearly all the land resources that are available to them, which points to a small margin of expansion for sown areas.

Table 22: Value Chain Shares (Rice, Millet, Maize) of Sown Areas by Zone

		Total sample	[SRV] – Irrigated rice Delta	[SRV] – Irrigated rice Middle Valley	[Casa] - Rainfed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Number of households		1 856	76	195	462	344	493	554
Total area owned by household (ha)	Mean	4,6	1.5	1,0	4,4	7,9	5,7	7,0
	Std dev.	4,3	1,2	0,9	4,3	4,5	4,6	4,3
	25 centiles	1.5	0,5	0,5	1.5	4,5	2.5	4,0
	Median	3,3	1,1	0,8	3,0	7,0	4,5	6,0
	75 centiles	6,5	2,0	1,2	5,6	10,4	7,3	9,0
Total area sown by household (ha)	Mean	4,5	1,3	1,0	4,1	7,8	5,5	6,8
	Std dev.	4,2	1,1	0,9	4,0	4,4	4,6	4,3
	25 centiles	1.5	0,5	0,5	1.5	4,5	2.4	3,8
	Median	3,0	1,0	0,8	3,0	7,0	4,3	6,0
	75 centiles	6,0	2,0	1,2	5,3	10,0	7,0	9,0
Sown areas out of total area owned (%)	Mean	97,3	95,9	100,0	96,3	98,9	96,2	98,5
	Std dev.	11,5	14,3	-	13,6	6,4	13,3	8,0
	25 centiles	100,0	100,0	100,0	100,0	100,0	100,0	100,0
	Median	100,0	100,0	100,0	100,0	100,0	100,0	100,0
	75 centiles	100,0	100,0	100,0	100,0	100,0	100,0	100,0
VA areas	Mean		94,5	94,4	44,5	16,0	29,4	36,7

(rice, millet, maize) out of total sown area (%)	Std dev.		0,3	0,4	0,3	0,1	0,2	0,2

Source: IPAR, Naatal Mbay Baseline Study, 2015

4.3. Human Capital and Land Management

Globally, 85.6% of parcel leaders are men, but the situation varies according to the zone. In the SRV-Delta, only 2.3% of parcel leaders are women whereas they are 5.4% in the SRV-Middle Valley and 17.9% in Casamance. This higher rate in Casamance is due to the dominant presence of women in rain-fed rice farming. The percentage of female parcel leaders in the SGB is 12.3%. In comparison with the other zones, the SRV counts the lowest number of woman farmers. An analysis by gender shows that globally, woman farmers make up for 65.8% of the farmers in women-led households, while they account for 12.4% of the farmers in men-led households.

Table 23: Distribution of Farmers by Gender of Household Head (HH) and Zone

Gender HH	Gender farmers	SRV - Delta		SRV - Middle Valley		Southern Groundnut Basin		Casamance		Group	
		Number	N column %	Number	N column %	Number	N column %	Number	N column %	Number	N column %
Male HH	Man	82	98,8%	298	99,0%	1 862	89,5%	2 335	84,0%	4 806	87,6%
	Woman	1	1,2%	3	1,0%	219	10,5%	444	16,0%	681	12,4%
	Total	83	100,0%	301	100,0%	2 081	100,0%	2 779	100,0%	5 487	100,0%
Fem. HH	Man	2	66,7%	-	0,0%	18	28,6%	40	35,4%	62	31,5%
	Woman	1	33,3%	14	100,0%	45	71,4%	73	64,6%	135	68,5%
	Total	3	100,0%	14	100,0%	63	100,0%	113	100,0%	197	100,0%
Total HH	Man	84	97,7%	298	94,6%	1 880	87,7%	2 375	82,1%	4 868	85,6%
	Woman	2	2,3%	17	5,4%	264	12,3%	517	17,9%	816	14,4%
	Total	86	100,0%	315	100,0%	2 144	100,0%	2 892	100,0%	5 684	100,0%

Source: IPAR, Naatal Mbay Baseline Study, 2015

For target crops, the majority of parcel leaders are men. They comprise 97% of parcel leaders for irrigated rice (SRV), 90% for rain-fed rice, 89% for maize, and 88% for millet in the SGB. In Casamance, 97% of the maize value chain is dominated by men. By contrast, in the case of Casamance rain-fed rice, women parcel leaders are in majority with 54% against 46% for the men.

Table 24: Distribution of Parcel Leaders by Gender and Value Chain

Farmers (column %)	[SRV] – Irrigated rice	[Casa] - Rainfed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet	Total
Man	97%	46%	89%	97%	88%	86%

Woman	3%	54%	11%	3%	12%	14%

Source: IPAR, Naatal Mbay Baseline Study, 2015

Parcel leaders have an average age of 48.4. SGB farmers seem to be younger – 46.5 years old on average – whereas SRV-Delta and SRV-Middle Valley farmers seem to be older – respectively 51.9 and 55.7 years old on average. Globally, among farmers, the men are older than the women by an average of 7 years.

Table 25: Average Age of Parcel Leaders by HH Gender and Zone

Gender HH	Gender farmers	SRV - Delta			SRV - Middle Valley			Southern Groundnut Basin			Casamance			Group		
		Nb	Mean*	σ	Nb	Mean	σ	Nb	Mean	σ	Nb	Mean	σ	Nb	Mean	σ
Male HH	Man	82	52,3	12,3	298	55,9	12,7	1 862	47,7	14,2	2 335	49,6	14,3	4 806	49,5	14,3
	Woman	1		.	3		219		36,9	13,6	444	41,9	12,6	681	40,6	13,4
	Total	83	52,3	12,2	301	55,9	12,8	2 081	46,5	14,5	2 779	48,4	14,3	5 487	48,4	14,5
Fem. HH	Man	2		0		.	.	18	30,0	14,8	40	42,5	14,1	62	38,3	14,9
	Woman	1		.	14		45		49,6	11,5	73	51,7	12,5	135	50,9	11,8
	Total	3		14			63		44,0	15,2	113	48,4	13,8	197	47,0	14,1
Total HH	Man	84	51,8	12,4	298	55,9	12,7	1 880	47,5	14,3	2 375	49,5	14,3	4 868	49,4	14,4
	Woman	2		17		52,9	13,4	264	39,1	14,0	517	43,3	13,0	816	42,3	13,7
	Total	86	51,9	12,3	315	55,7	12,8	2 144	46,5	14,6	2 892	48,4	14,3	5 684	48,4	14,5

Nb : Number or size
Moy = Mean
σ = Standard deviation
*Means with sample sizes inferior to 15 are not listed.

Source: IPAR, Naatal Mbay Baseline Study, 2015

5. PRODUCTION AND MARKETING

5.1. Production Costs and Yields

Production costs amount to CFAF 475,519/ha for irrigated rice in the Delta, a sum primarily allocated to fertilizers (CFAF 73,780/ha), harvesting (CFAF 76,761/ha), seeds (CFAF 53,454/ha), and herbicides (CFAF 63,509/ha). In the Middle Valley, the total cost per hectare is CFAF 255,441/ha. The lower production costs per hectare were recorded in the rain-fed value chain in Casamance, where they amount to CFAF 12,966/ha.

Table 26: Production Costs per Hectare according to Farming Practices and by Value Chain

	Gender HH	Nb Households	Cost of labor and services in CFAF/ha								Input purchases (CFAF/ha)			
			Soil Preparation	Seeding	Fertilization	Weeding	Harvesting	Threshing	Storage	Agricultural Insurance	Seeds	Fertilizer	Chemical pesticide	Total expenses

Total sample	M	1841	3542	332	156	594	4343	3122	220	0	3380	6187	2236	24113
	W	90	6349	419	237	1142	8928	9902	256	0	3457	4724	1986	37399
	Total	1931	3614	334	158	608	4460	3251	221	0	3382	6150	2230	24407
[SRV] – Irrigated rice Delta	M	83	38798	37757	599	108155	77681	9886	3171	10769	55015	73631	65164	480625
	W	3												
	Total	86	38033	37658	692	108225	76761	9438	3347	10623	53454	73780	63509	475519
[SRV] – Irrigated rice MV Vallée	M	194	22324	25569	688	56414	17233	10479	209	1457	24282	74149	22792	255598
	W	6												
	Total	200	22616	25447	674	55908	17024	10627	207	1650	24237	74175	22876	255441
[Casa] - Rainfed rice	M	442	1746	270	88	393	1595	996	2590	0	633	3003	809	12123
	W	38	7115	472	0	779	4578	4930	9507	24	1487	3198	165	32254
	Total	480	1991	276	82	407	1722	1179	2901	1	668	2973	766	12966
[SGB] - Maize	M	349	2009	108	172	897	1061	4997	412	42	1215	34381	0	45295
	W	4												
	Total	353	2025	109	174	904	1070	5084	415	42	1228	34707	0	45757
[Casa] - Maize	M	490	1784	335	115	355	674	1502	298	47	448	11619	2704	19880
	W	15	4584	739	37	2403	961	444	67	0	621	6174	370	16400
	Total	505	1842	343	114	395	682	1488	295	47	453	11562	2671	19891
[SGB] - Millet	M	557	445	90	238	730	1180	12103	777	10	487	24288	0	40348
	W	21	0	0	0	555	578	11495	421	0	756	20282	0	34086
	Total	578	435	88	233	727	1168	12104	770	10	494	24225	0	40253

Source: IPAR, Naatal Mbay Baseline Study, 2015

Values for which the size of the households is inferior to 15 are not listed. The highest yields recorded were generated by SRV irrigated rice, with 7,050 kg/ha in the Delta and 4,285 kg/ha in the Middle Valley. SGB maize is second with a yield of 793 kg/ha, followed by Casamance rain fed rice with 693 kg/ha, and Casamance maize with 671 kg/ha. The lowest yields were recorded in the SGB millet value chain with an average output of 624 kg/ha.

5.2. Marketing

Results show that a very small proportion of the farming production of the households is intended for the market. Across the entire sample, only 11% of the harvest is sold. The same observation can be made for nearly all crops with the exception of irrigated rice, for which a third (31%) of the Delta harvest and 15% of the Middle Valley harvest are sold. The households of the SGB value chains (maize, millet) sell approximately 12% of their production while Casamance households sold between 3% (rain-fed rice) and 6% (maize) of their harvest.

Table 27: Situation of Farming Operations by Value Chain and Gender of Household Head

		Nb of VC parcels per household	Parcel area (ha)	Production volume (kg)	Volume sold (Kg)	Sales revenues (CFAF)	Yield (Kg/Ha)	Share of the harvest sold	Average price (Revenues/Volume sold)
Total sample	Male HH	2,3	2.5	2262	503	71 791	1 379	10%	140
	Fem HH	1,8	1,3	1220	575	53 009	1 359	12%	69
	Total	2,3	2.4	2213	506	70 931	1 378	11%	136
[SRV] – Irrigated rice Delta	Male HH	1,2	1,7	11 942	4765	559 468	7 119	30%	130
	Fem HH	1,3	3,3	15 195	10745	1 083 667	5 182	42%	88
	Total	1,2	1,8	12 056	4979	578 189	7 050	30%	128
[SRV] – Irrigated rice MV Vallée	Male HH	1,1	0,9	3 194	585	74 570	4 265	14%	133
	Fem HH	1,3	0,4	1 702	275	40 417	4 940	20%	146
	Total	1,1	0,9	3 149	576	73 520	4 285	15%	133
[Casa] - Rainfed rice	Male HH	1,9	1,2	595	238	1 725	696	3%	231
	Fem HH	1,4	0,9	430	133	2 566	666	7%	247
	Total	1,9	1,2	582	219	1 793	693	3%	234
[SGB] - Maize	Male HH	2,1	1,2	1 105	260	58 577	794	12%	202
	Fem HH	2	0,8	493	0	0	673	0%	.
	Total	2,1	1,2	1 098	257	58 371	793	12%	202
[Casa] - Maize	Male HH	1,8	1,4	869	106	17 708	674	6%	176
	Fem HH	1,6	0,8	364	63	14 250	572	13%	225
	Total	1,9	1,4	854	104	17 605	671	6%	178
[SGB] - Millet	Male HH	1,6	2.4	1 682	302	71 999	630	12%	211
	Fem HH	1,3	1,6	883	157	41 692	476	8%	163
	Total	1,6	2,3	1 652	296	71 121	624	12%	210

Source: IPAR, Naatal Mbay Baseline Study, 2015

5.3. Contractualization

The table below shows that 95% of surveyed farmers do not have a marketing contract. Among surveyed farmers of the SRV, approximately 7.5% of Delta farmers have at least one contract. The majority of those are short-term contracts (54.5%), although a good part of them are permanent or regular contracts (45.5%). In the Middle Valley, however, none of the farmers interviewed had a sales contract. In the SGB maize value chain 2.1% of the farmers have at least one sales contract, while that category makes up 1.7% of the Casa maize farmers. Globally, harvest sales happen on an occasional basis with no prior contract.

Table 28: Use of Sales Contracts by Value Chain and HH Gender

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.
Commercial (column %)																					
Contract	5,2	0	5,1	7,8	0	7,5	0	0	0	1,1	0	1	2,1	0	2,1	1,8	0	1,7	0,6	0	0,6
Contract Frequency (column %)																					
Occasional	27,3	0	27,3	54,5	0	54,5	0	0	0	42,9	0	42,9	100	0	100	28,6	0	28,6	33,3	0	33,3
Regular	53,2	0	53,2	9,1	0	9,1	0	0	0	21,4	0	21,4	0	0	0	57,1	0	57,1	66,7	0	66,7
Permanent	19,5	0	19,5	36,4	0	36,4	0	0	0	35,7	0	35,7	0	0	0	14,3	0	14,3	0	0	0

M= Male Head of Household
W= Female Head of Household
Tot.= Total
Source: IPAR, Naatal Mbay Baseline Study, 2015

6. FARMING TECHNOLOGIES AND GOOD PRACTICES

6.1. Soil Preparation

Traditional methods still remain dominant for soil preparation. In more than 2/3 (66.2%) of farmed parcels, soil preparation is done manually. This is especially common in Casamance, where soil preparation for rain-fed rice is 88.7% manual. The SRV sets itself apart with a considerable proportion of tractor users (98.3% in the Delta and 88.8% in the Middle Valley). This confirms the greater importance of mechanization in the SRV and partially explains the relatively high yields recorded in that zone.

Table 26: Distribution of Plots by Type of Soil Preparation and by Value Chain

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	M	W	Total	M	W	Total	M	W	Total	M	W	Total	M	W	Total	M	W	Total	M	W	Total
Soil preparation method (column %)																					
Manual	65,8	76,3	66,2	0,9	0,0	0,8	9,2	0,0	8,9	88,8	87,6	88,7	58,9	50,0	58,8	62,9	73,3	63,2	78,7	82,8	78,9
Animal traction	20,8	12,2	20,4	0,0	0,0	0,0	1,8	0,0	1,8	8,5	8,3	8,5	34,6	50,0	34,7	32,8	20,0	32,5	20,1	17,2	20,0
Tractor	12,3	10,7	12,2	98,3	100,0	98,3	88,5	100,0	88,8	2.4	4,1	2.5	6,2	0,0	6,2	3,3	6,7	3,4	0,2	0,0	0,2

None	1,1	0,8	1,1	0,9	0,0	0,8	0,5	0,0	0,4	0,3	0,0	0,3	0,3	0,0	0,3	1,0	0,0	0,9	1,0	0,0	1,0

M= Male Head of Household
W= Female Head of Household
Source: IPAR, Naatal Mbay Baseline Study, 2015

The soil preparation technologies promoted by the project are Plowing, Off-setting and Ripping. It should be noted that nearly half of the farmers have already adopted these management practices on their various plots. As shown in the table below, 45.5% of farmers apply either Plowing, Off-setting, or Ripping.

In the SRV, nearly all farmers have applied one of these practices on a portion of their parcels, with a few significant differences. In the Delta, 95.5% of them applied Off-setting against 2.5% for Plowing, while the Middle Valley presents a wider dispersion with 20.5% for Plowing, 61.6% for Off-setting, and 15.6% for Ripping.

In the cases of rain-fed rice in Casamance, millet in the SGB, and maize in the SGB and Casamance, high percentages of parcels where none of the promoted practices have been implemented were recorded. For maize, they reach 74% in the SGB and 56% in Casamance. As for millet in the SGB, that situation concerns 100% of the parcels.

Table 27: Distribution of Farmed Plots by Type of Soil Preparation and by Value Chain

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	M	W	Total	M	W	Total	M	W	Total	M	W	Total	M	W	Total	M	W	Total	M	W	Total
Soil preparation method (column %)																					
Plowing	34,6	55,7	35,4	2,6	0,0	2.5	21,2	0,0	20,5	71,1	83,6	72,1	26,6	0,0	26,5	42,1	80,0	43,2	9,2	4,2	9,0
Off-setting	8,5	6,1	8,4	97,4	100,0	97,5	61,8	57,1	61,6	1,0	0,0	0,9	0,3	0,0	0,3	0,4	0,0	0,4	0,0	0,0	0,0
Ripping (CF)	1,7	2,3	1,7	0,0	0,0	0,0	14,7	42,9	15,6	2,7	0,0	2.5	0,0	0,0	0,0	0,2	0,0	0,2	0,0	0,0	0,0
Shallow cultivation	17,1	9,2	16,8	0,0	0,0	0,0	1,8	0,0	1,8	4,7	0,0	4,3	40,2	100,0	40,6	19,9	6,7	19,5	28,1	29,2	28,1
Brush clearing	25,3	18,3	25,0	0,0	0,0	0,0	0,5	0,0	0,4	6,9	4,0	6,7	18,0	0,0	17,9	30,1	13,3	29,6	34,2	50,0	34,8
Ridging	2,0	3,8	2,1	0,0	0,0	0,0	0,0	0,0	0,0	8,8	10,5	8,9	0,3	0,0	0,3	0,8	0,0	0,8	0,3	0,0	0,3
None	10,8	4,6	10,6	0,0	0,0	0,0	0,0	0,0	0,0	4,7	1,8	4,5	14,5	0,0	14,4	6,6	0,0	6,4	28,2	16,7	27,8

M= Male Head of Household
W= Female Head of Household
Source: IPAR, Naatal Mbay Baseline Study, 2015

6.2. Quality Seeds

Irrigated rice producers have the highest percentage utilization of certified seeds (88.8% in the Delta and 44.9&) in the Middle Valley. Over 3/4 of the seeds used in the Delta and a little less than half of the seeds in the Middle Valley are certified. In the other value chains, recorded percentages are much lower. They are particularly small for rain-fed rice (10.9%) and maize (9.6%) in Casamance, and for millet in the SGB (4.7%).

Households using exclusively certified seeds account for only 9.5% of the sample. However, there are disparities between zones. In the SRV, the proportion of households using exclusively certified seeds is fairly large in the Delta and Middle Valley sub-zones, with 72.1% and 36.2% respectively. Unlike the SRV, the other zones display fairly low percentages of households using certified seeds exclusively. For rain-fed rice and maize in Casamance they are 10% and 8.9% respectively, while the proportions in the SGB for maize and millet are 8.2% and 3.8% respectively.

Households combining certified seeds and non-certified seeds account for 7.1% of the total sample. This percentage is considerably lower everywhere except in the Delta sub-zone of the SRV where 7.0% of the households use a combination of the two. Results show a percentage of 0% for the Middle Valley sub-zone of the SRV, 2.5% and 2.0% respectively for rain-fed rice and maize in Casamance, and 2.3% and 3.5% respectively for maize and millet in the SGB.

Table 28: Use of Certified Seeds by Gender of Household Head and by Zone

		Number	Certified seeds only (%)	Non-certified seeds only(%)	Combination of the two (%)	Certified seeds (Kg/ha)	Non-certified seeds (Kg/ha)	Seeds (Kg/ha)	Proportion of certified seeds (%)
Total sample	Male HH	1841	9.5	83,3	7,2	7,4	20,9	28,4	37,9
	Female HH	90	8,9	85,6	5,6	6,5	26,8	33,2	31,3
	Total	1931	9.5	83,4	7,1	7,4	21,2	28,6	37,7
[SRV] – Irrigated rice Delta	Male HH	83	73,5	21,7	4,8	105,5	29,0	137,1	89,9
	Female HH	3							
	Total	86	72,1	20,9	7,0	105,4	29,2	137,0	88,8
[SRV] – Irrigated rice Middle Valley	Male HH	193	36,3	63,7	0,0	34,2	56,8	91,1	44,7
	Female HH	6							
	Total	199	36,2	63,8	0,0	34,3	56,7	91,2	44,9
[Casa] - Rainfed rice	Male HH	442	10,0	87,3	2,7	3,5	42,5	47,2	10,9
	Female HH	38	10,5	89,5	0,0	2,3	40,7	81,7	10,9
	Total	480	10,0	87,5	2.5	3,5	42,4	49,8	10,9
[SGB] - Maize	Male HH	349	8,0	89,7	2,3	1,8	17,1	18,9	7,8
	Female HH	4							
	Total	353	8,2	89,5	2,3	1,8	17,0	18,9	7,8
[Casa] - Maize	Male HH	490	8,8	89,2	2,0	1,7	16,2	18,1	9.5
	Female HH	15	13,3	86,7	0,0	2,0	15,4	17,4	13,3
	Total	505	8,9	89,1	2,0	1,7	16,2	18,0	9,6
[SGB] - Millet	Male HH	557	3,9	92,6	3,4	0,2	17,2	4,3	4,7
	Female HH	21	0,0	95,2	4,8	0,2	.	4,2	4,2
	Total	578	3,8	92,7	3,5	0,2	17,2	4,3	4,7

Source: IPAR, Naatal Mbay Baseline Study, 2015

The use of a seed drill is fairly common, especially for maize and rice farming. This can be observed in Casamance (83%) and in the SGB (99%). Where rain-fed rice is concerned, seed drills are used on only 39.9% of SGB parcels, most probably because of the presence of upland rice, whereas in Casamance seed drills are used less frequently, i.e. on less than 10% of the parcels, because of the higher proportion of lowland rice, for which seed drills are ill-suited. Contrary to what has been observed in the other zones, seed drills are not used in the SRV, where the most widespread practice is broadcast application in conjunction with priming, which is applied at 95.6% in the Delta and 88.9% in the Middle Valley. In Casamance, the practices of rice-transplanting (37.5%) and broadcast application without priming (46.4%) are most commonly used.

Table 29: Seeding Method by Value Chain

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
column %	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total
Seeding method																					
Transplanting (nursery)	10,2	25,2	10,8	2,3	0,0	2.2	11,6	0,0	11,1	36,7	46,3	37,5	0,0	0,0	0,0	3,5	6,7	3,6	0,0	0,0	0,0
Broadcast application w/ priming	8,6	9,2	8,6	95,4	100,0	95,6	88,4	100,0	88,9	4,4	4,6	4,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Broadcast application w/o priming	10,5	20,6	10,9	1,1	0,0	1,1	0,0	0,0	0,0	46,8	40,8	46,4	0,0	0,0	0,0	1.5	13,3	1,9	0,0	0,0	0,0
Regrowth	0,9	0,0	0,9	0,0	0,0	0,0	0,0	0,0	0,0	0,5	0,0	0,5	0,3	0,0	0,3	2,3	0,0	2,3	0,0	0,0	0,0
Seed drill	61,5	35,9	60,5	0,0	0,0	0,0	0,0	0,0	0,0	10,1	6,5	9,8	99,1	100,0	99,1	83,6	66,7	83,1	99,2	95,8	99,1
Others	8,4	9,2	8,4	1,1	0,0	1,1	0,0	0,0	0,0	1.5	1,8	1.5	0,6	0,0	0,6	9,1	13,3	9,2	0,8	4,2	0,9

Source: IPAR, Naatal Mbay Baseline Study, 2015

The seeds used in rain-fed zones mostly come from the own seed stock of the households (77% of parcels). In the SRV, the most solicited supply sources are the local market (44% in the Delta and 34.7% in the Middle Valley) and the networks (29.7% in the Delta and 37.5% in the Middle Valley). In the rain-fed rice value chain of the SGB, although farmers are supplied by projects/NGOs (21.5%) and local markets (23.9%), their own stocks account for 38.8% of the seeds used. This proportion is of 85.6% for rain-fed rice, 75.6% for maize in the SGB, 83.1% for maize in Casamance, and 75% for millet.

Table 30: Origin of Seeds by Value Chain

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total	Male HH	Female HH	Total
Main seed supply source																					
Own stock	76,7	81,7	76,9	13,8	0,0	13,2	15,9	33,3	16,7	85,2	89,7	85,6	75,4	100,0	75,6	83,0	86,7	83,1	75,4	100,0	75,6
National agricultural program	3,6	2,3	3,6	10,3	0,0	9,9	2,9	0,0	2,8	4,4	4,1	4,4	7,4	0,0	7,4	4,8	0,0	4,7	7,4	0,0	7,4
Projects/NGOs	3,1	3,1	3,1	3,4	0,0	3,3	7,2	33,3	8,3	3,8	4,2	3,8	4,1	0,0	4,1	3,9	0,0	3,8	4,1	0,0	4,1
Networks	4,1	3,8	4,0	28,7	50,0	29,7	37,7	33,3	37,5	3,3	0,0	3,0	3,8	0,0	3,8	0,4	0,0	0,4	3,8	0,0	3,8
Local market/SP	12,5	9,2	12,4	43,7	50,0	44,0	36,2	0,0	34,7	3,3	2,0	3,2	9,2	0,0	9,1	7,9	13,3	8,1	9,2	0,0	9,1

Source: IPAR, Naatal Mbay Baseline Study, 2015

6.3. Fertilization

NPK and DAP fertilizers and urea are applied on approximately 3 parcels out of 5 among survey households. Millet and maize in the SGB are the only crops for which the utilization rate is not over 95%. However, it should be noted that the quantity of fertilizer used per hectare varies widely according to the zone. What should be highlighted are the low quantities of fertilizer used for rain-fed rice in Casamance, the considerable use of DAP and urea in the SRV, and the high utilization rate of NPK and urea for maize in the SGB.

Table 31: Use of NPK, DAP and UREA Fertilizers by Value Chain

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.	M	W	Tot.
NPK																					
% users	60,9	2.5	63,5	11,8	,0	11,4	13,6	16,7	13,7	99,8	100,0	99,8	80,8	100,0	80,9	99,6	100,0	99,6	84,9	95,8	85,3
Application rate (kg/ha)	27,8	20,7	27,6	339,42	.	339,42	121,80	100,0	121,03	12,1	17,7	12,5	113,8	100,0	113,7	45,5	8,3	44,5	61,7	27,4	60,4
% users	60,8	2.5	63,4	67,3	100,0	68,4	58,3	33,3	57,6	99,8	100,0	99,8	80,8	100,0	80,9	99,6	100,0	99,6	84,9	95,8	85,3
DAP																					
Application rate (kg/ha)	19,0	10,8	18,8	118,11	129,17	118,67	115,64	183,33	116,79	3,4	2,8	3,4	0,0	0,0	0,0	8,2	4,4	8,1	58,5	0,0	56,1

Urea																				
% users	60,8	2.5	63,4	95,5	100,0	95,6	99,0	100,0	99,0	99,8	100,0	99,8	80,8	100,0	80,9	99,6	100,0	99,6	84,9	95,8	85,3
Application rate (kg/ha)	0,7	1,1	0,7	276,18	345,83	278,73	276,94	340,97	278,83	13,69	8,8	13,3	241,0	50,0	239,6	26,7	25,6	26,7	6,8	6,5	6,8

M= Male Head of Household; W= Female Head of Household; Tot.= Total

Source: IPAR, Naatal Mbay Baseline Study, 2015

In 86.8% of Delta parcels and 96% of Middle Valley parcels, fertilizer is used in double application, which is a recommended practice. However, in the other value chains, a single application was carried out on the majority of parcels, especially for rain-fed rice and maize in the SGB.

Table 32: Fertilizer Application Method by Value Chain

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHHH	Total	MHH	FHHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Urea application method																					
Single application	22,6	15,3	22,3	10,3	0,0	9,9	3,7	0,0	3,6	16,2	17,0	16,3	51,5	50,0	51,5	22,4	13,3	22,1	0,0	0,0	0,0
Double application	17,2	14,5	17,1	86,3	100,0	86,8	95,9	100,0	96,0	8,5	2,1	8,0	16,6	0,0	16,5	11,2	20,0	11,4	0,0	0,0	0,0
Deep application	0,7	1.5	0,8	2,6	0,0	2.5	0,5	0,0	0,4	0,2	0,0	0,2	0,3	0,0	0,3	1,2	0,0	1,1	0,0	0,0	0,0
No application	59,5	68,7	59,8	0,9	0,0	0,8	0,0	0,0	0,0	75,1	80,9	75,6	31,7	50,0	31,8	65,3	66,7	65,3	0,0	0,0	0,0

Source: IPAR, Naatal Mbay Baseline Study, 2015

6.4. Weeding

Globally, the most widespread method of weed control is the use of weeding hoe, as in 53.6% of the parcels. Globally, the level of herbicide application remains fairly low with a percentage of 8.9%. This practice is mostly used in the SRV where it concerns 99.2% of Delta parcels and 53.6% of Middle Valley parcels. In Casamance, the use of herbicides is almost inexistent and concerns less than 7% of the parcels in any value chain. In the SGB, we observed an absence of herbicides in all value chains.

Table 33: Primary Weed Control Method by Value Chain

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Table 33: Primary Weed Control Method (column %)																					
Weeding hoe	54,4	34,4	53,6	0,0	0,0	0,0	1,8	0,0	1,8	11,0	12,6	11,2	80,8	100,0	80,9	63,1	40,0	62,5	79,2	79,2	79,2
Manually	36,6	58,8	37,5	0,9	0,0	0,8	44,2	57,1	44,6	86,3	87,4	86,4	18,9	0,0	18,8	29,9	53,3	30,6	20,8	20,8	20,8
Herbicides	9,0	6,9	8,9	99,1	100,0	99,2	53,9	42,9	53,6	2,6	0,0	2.4	0,3	0,0	0,3	6,9	6,7	6,9	0,0	0,0	0,0

Source: IPAR, Naatal Mbay Baseline Study, 2015

6.5. Harvesting and Threshing

The use of machines is very rare and only 1% of the parcels were harvested mechanically. The SRV remains the zone with the highest levels of mechanized harvesting, i.e. 5.8% of the parcels in the Delta and 2.7% in the Middle Valley.

Table 34: Primary Harvesting Method by Value Chain

column %	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Main harvesting method																					
Manual	99,0	99,2	99,0	94,0	100,0	94,2	97,7	85,7	97,3	98,7	100,0	98,8	0,0	0,0	0,0	0,0	0,0	0,0	99,7	100,0	99,7
Mechanized	1,0	0,8	1,0	6,0	0,0	5,8	2,3	14,3	2,7	1,3	0,0	1,2	0,0	0,0	0,0	0,0	0,0	0,0	0,3	0,0	0,3

Source: IPAR, Naatal Mbay Baseline Study, 2015

The level of mechanization is higher for threshing operations, as it concerns 34% of the parcels. In the SRV, this proportion reaches 95% in the Delta and barely 10% in the Middle Valley. Rain-fed rice remains the crop for which manual threshing is the most common method, implemented in 94.6% of the parcels.

Table 35: Primary Threshing Method by Value Chain35

Column %	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Main threshing method																					
Manual	66,0	79,4	66,0	4,3	25,0	5,0	90,3	85,7	90,2	94,5	95,9	94,6	34,0	50,0	34,1	91,9	93,3	91,9	14,4	25,0	14,7
Mechanized	34,0	20,6	34,0	95,7	75,0	95,0	9,7	14,3	9,8	5,5	4,1	5,4	66,0	50,0	65,9	8,1	6,7	8,1	85,6	75,0	85,3

Source: IPAR, Naatal Mbay Baseline Study, 2015

6.6. Storage

Open-air storage or private shelters are the most common methods, used by 41.3% and 34.9% of households respectively. For maize cobs, open-air storage is the most widespread method, with 70.6% in the SGB and

45% in Casamance. This is also the case with millet cobs, for which 80.4% of households use open-air storage. As for paddy rice, traditional granaries are the most common method in the SGB where they are used by 53.8% of households, while private shelters come in first place in Casamance with 61.1% of households. In the SRV, paddy rice is most frequently stored in private shelters and community shelters in the Delta, whereas private shelters are more popular in the Middle Valley.

Table 36: Harvest Storage Methods by Value Chain

Primary Storage Method (column %)	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	Male HH	Fem HH	Total	Male HH	Fem HH	Total	Male HH	Fem HH	Total	Male HH	Fem HH	Total	Male HH	Fem HH	Total	Male HH	Fem HH	Total	Male HH	Fem HH	Total
	Paddy rice												Maize cobs						Millet cobs		
Open air	42	24,6	41,3	0,9	0	0,9	0	0	0	16,6	6,4	15,8	70,7	50	70,6	46,1	26,7	45,6	81,2	58,3	80,4
Under tarp	6,4	9,2	6,6	0	0	0	0	0	0	3	2,1	2,9	15,7	50	15,9	2,3	6,7	2.4	11,3	20,8	11,6
Private shelter	34,1	53,8	34,9	48,2	25	47,4	70,9	83,3	71,2	59,5	80,9	61,1	10,1	0	10	35,1	46,7	35,5	5,6	16,7	6
Community shelter	2,1	2,3	2,1	39,1	75	40,4	4	0	3,9	1,6	0	1.5	0,3	0	0,3	0,2	0	0,2	0,5	0	0,4
Rented shelter	0,2	0	0,2	2,7	0	2,6	0,5	0	0,5	0	0	0	0,3	0	0,3	0,4	0	0,4	0	0	0
Traditional granary	10	4,6	9,8	0,9	0	0,9	6	0	5,9	15,4	6,4	14,7	2,1	0	2,1	8,9	6,7	8,8	1,2	0	1,2
Other	2.2	1.5	2.2	1,8	0	1,8	18,6	16,7	18,5	0,5	0	0,5	0	0	0	0,8	0	0,8	0,2	0	0,1
No storage	3	3,8	3	6,4	0	6,1	0	0	0	3,5	4,3	3,5	0,9	0	0,9	6,2	13,3	6,4	0	4,2	0,1

Source: IPAR, Naatal Mbay Baseline Study, 2015

The analysis of the table below leads to the observation that very few farmers apply management practices to preserve stocks. Globally, no preservation practices were implemented for nearly 3 quarters of the harvests. In the SRV, where paddy rice is concerned, less than 20% of households in the Middle Valley and less than 10% of them in the Delta applied stock preservation practices. For rain-fed rice, however, over half of them used organic stock preservation methods (53.8%) in the SGB, while less than 15% of them used those methods in Casamance. Globally, the use of chemical pesticides for stock preservation

purposes is low, at 12.7%. The SGB displays the highest level of chemical pesticide use for harvest preservation, with 39.5% for millet and 23.2% for maize.

Table 37: Methods for the Preservation of Harvest Stocks by Value Chain

Column %	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total

Main preservation methods for:	paddy rice									maize cobs						millet cobs		
Chemical pesticides	13	6,9	12,7	2,7	0	2,6	3	0	2,9	0,3	0	0,3	23,4	0	23,2	2,3	0	2,3	39,8	29,2	39,5
Organic methods	10,3	13,8	10,4	0	0	0	3,5	0	3,4	9,8	6,4	9.5	6,5	50	6,8	10,4	6,7	10,3	11,9	16,7	12,1
Others	4,4	2,3	4,3	2,7	50	4,4	11,6	0	11,2	4	0	3,7	1,8	0	1,8	3,7	6,7	3,8	1,7	0	1,6
None	72,3	76,9	72,5	94,5	50	93	81,9	100	82,4	85,9	93,6	86,5	68,3	50	68,2	83,6	86,7	83,7	46,6	54,2	46,8

Source: IPAR, Naatal Mbay Baseline Study, 2015

When it comes to grain storage, significant differences can be noted in comparison to the storage of production in other forms. The use of open-air storage is almost inexistent. Private shelters, however, remain very common (67.9%). In the SRV, white rice is either stored in private shelters (54.1% in the Middle Valley and 10.5% in the Delta) or not stored at all (38.5% in the Middle Valley and 78.9% in the Delta). In the SGB, private shelters are used by 92.3% of the households for rain-fed rice, 80.6% for maize, and 78.9% for millet. A similar situation is found in Casamance, although in smaller proportions. Private shelters are used for rice by 62.5% of households while the percentage for maize is 72.6%.

Table 38: Storage Methods for White Rice and Maize and Millet Grains

Column %	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Main storage methods for:				white rice									maize grains						millet grains		
Open air	6,1	0	2,1	0	0	0	0	0	0	2,6	0	2.4	4,4	0	4,4	2,7	0	2,6	2,7	0	2,7
Under tarp	1,6	1.5	1,6	0	0	0	0	0	0	0,7	2,1	0,8	2,7	0	2,6	0,4	0	0,4	4	0	3,8
Private shelter	67,6	74,6	67,9	10,9	0	10,5	53,8	66,7	54,1	61,8	70,2	62,4	80,5	100	80,6	72,2	86,7	72,6	78,5	91,7	78,9
Community shelter	2.5	0	2.4	7,3	0	7	1	0	1	1,2	0	1,1	4,4	0	4,4	1,7	0	1,7	5	0	4,9
Rented shelter	0,7	0	0,7	1,8	0	1,8	0	0	0	0	0	0	0,6	0	0,6	0,4	0	0,4	2,7	0	2,7
Traditional granary	10	13,1	10,1	0	0	0	4	0	3,9	18,8	19,1	18,9	3	0	2,9	7,1	6,7	7,1	4,4	4,2	4,4
Others	1.5	0,8	1.5	1,8	0	1,8	2.5	0	2.4	0,3	0	0,3	0,6	0	0,6	0,4	0	0,4	1.5	0	1.5
No storage	13,7	10	13,6	78,2	100	78,9	38,7	33,3	38,5	14,5	8,5	14	3,8	0	3,8	15,1	6,7	14,8	1,1	4,2	1,2

Source: IPAR, Naatal Mbay Baseline Study, 2015

In the case of stock preservation after processing or shelling, it should be noted that no preservation methods are used on the majority of the stocks. Only 18.9% of stocks have been subject to the application of preservation practices. It appears that stock preservation practices do not change after output processing or shelling. As it happens with the preservation of raw production stocks, we noted that the SGB displays the highest proportions of chemical pesticide use for the preservation of maize and millet grains, i.e. over 20% for

maize grains and over 13% for millet grains. For rain-fed rice, stock preservation practices are applied on more than 3/5 of the harvest. The use of chemical pesticides was also recorded in Casamance, albeit in very low proportions. Globally, the lowest level of application of stock preservation practices can be found in the SRV, for both paddy rice and white rice.

Table 39: Preservation Methods for White Rice and Maize and Millet Grains

	Total sample			[SRV] – Irrigated rice Delta			[SRV] – Irrigated rice Middle Valley			[Casa] – Rain-fed rice			[SGB] - Maize			[Casa] - Maize			[SGB] - Millet		
	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total	MHH	FHH	Total
Main preservation methods for:				white rice									maize grains						millet grains		
Chemical pesticides	6,6	4,6	6,6	0	0	0	0	0	0	0,2	0	0,2	20,4	0	20,3	2,9	0	2,8	13,6	20,8	13,8
Organic methods	8,9	12,3	9,1	0	0	0	4	0	3,9	9,2	4,3	8,9	6,2	50	6,5	8,1	6,7	8,1	10,1	16,7	10,3
Other	3,4	0	3,3	1,8	0	1,8	8	0	7,8	2,6	0	2.4	0,9	0	0,9	2,3	0	2,3	1.5	0	1.5
None	81	83,1	81,1	98,2	100	98,2	87,9	100	88,3	88	95,7	88,5	72,5	50	72,4	86,7	93,3	86,9	74,8	62,5	74,4

Source: IPAR, Naatal Mbay Baseline Study, 2015

7. BASELINE LEVELS OF SELECTED INDICATORS

7.1. Gross margins per hectare

The gross margin per hectare is the value of the production minus direct cash operating expenses without the investment in hard assets and the amortization. Expenses comprise several costs: paid workforce, seeds, fertilizers, harvesting, storage, and water.

The table below does not take into account the results for rain-fed rice in the SGB, which only concern a sample of 10 households. This means that globally, gross margins per hectare for irrigated rice in the SRV (CFAF 348,834/ha) are higher than for the other crops in the other zones. Rain-fed rice in Casamance comes in second position, followed distantly by maize in the same zone. Millet and maize from the SGB are fourth and fifth. However, relatively high standard deviations (σ) reveal that the different mean values conceal disparities between the farming households of each target crop.

Due to the fact that the numbers of households with "an adult man only" and "an adult woman only" are statistically low, the trends that emerge from the total sample remain accurate for households with "adult men and women", which constitute most of the surveyed households.

Table 40: Gross Margins per hectare (CFAF)

	Total sample	[SRV] – Irrigated rice	[Casa] - Rainfed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Mean	198 345	348 834	210 420	81 872	89 396	87 204

Total sample	σ	284 688	366 508	362 203	111 836	94 130	108 348

	Number	1 931	286	476	351	503	572
Household type							
Adult man only	Mean	226 466					
	σ	303 799					
	Number	29	3	13	1	8	7
Adult woman only	Mean	127 663					
	σ	160 250					
	Number	23	2	8	3	6	6
Adult men and women	Mean	198 776	347 996	211 916	82 599	89 776	86 780
	σ	285 554	368 741	364 177	112 245	94 071	106 762
	Number	1 879	281	455	347	489	559

σ = Standard deviation

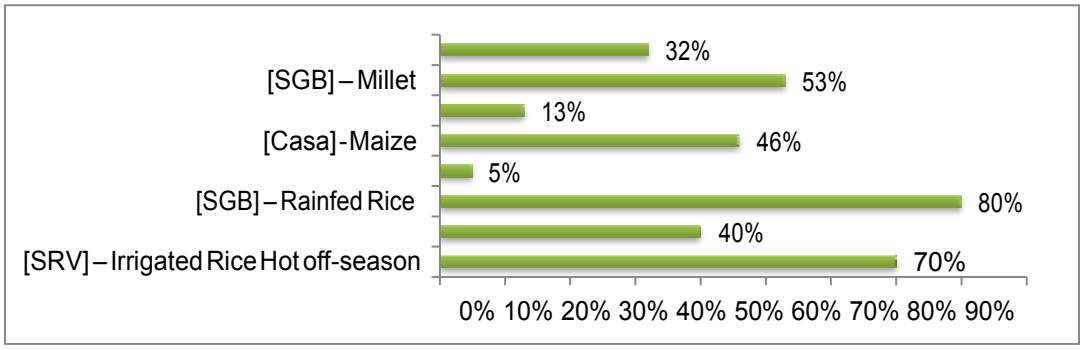
Source: IPAR, Naatal Mbay Baseline Study, 2015

7.2. Harvest Marketing

Harvest marketing concerns only 32% of the sample households, with proportions that vary significantly according to the zone and value chain. In the case of irrigated rice, 70% of the SRV households that harvested hot dry season irrigated rice reported having sold some of their production, whereas 40% of the households that harvested rainy season irrigated rice reported sales. This difference can be explained by the presence in the sample of Middle Valley (Podor and Matam households, where most of the production is carried out during the rainy season and there is a generally low level of surplus sales.

For rain-fed rice, the data obtained about the SGB only apply to 10 households and should therefore be considered with caution. However, results show that only 5% of Casamance households sold their rice surplus. In that zone, the production of rice is mostly intended for self-consumption and cash crops tend involve new seed varieties. As for maize, commercial production concerns 46% and 13% of households in the SGB and Casamance respectively. In the case of millet, data shows that a majority of SGB households (53%) sold their production surplus. Nevertheless, millet sales usually involve small quantities and it remains primarily a home consumption crop in the SGB.

Chart 1: Distribution of Households Having Sold Part of their Production



Source: IPAR, Naatal Mbay Baseline Study, 2015

Within the sub-sample of households having sold some of their production, rice in general and HOS irrigated rice in particular (CFAF 479,794) display by far the highest sales in terms of average value per household and in comparison with other value chain. The marked difference in marketing observed between HOS irrigated rice and rainy season rice could be explained by low harvest volumes in the rainy season comparison to the HOS, and the fact that rainy season irrigated rice is primarily grown for home consumption

SGB millet (CFAF 223,710) comes in second position after rice. Maize from Casamance (CFAF 193,588) and maize from the SGB (CFAF 161,183) then follow. The low numbers of rain-fed rice households in the SGB and Casamance do not allow for an accurate analysis. Moreover, the fairly high standard deviations (σ) of the means point to the existence of considerable disparities between households according to the target crop.

Table 41: Sales Revenues of Households having sold production on the market

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	319 039	479 794	158 087	161 183	193 588	223 710
	σ	542 134	847 809	203 774	172 582	335 196	230 664
	Number	622	147	26	164	63	304
Household type							
Adult man only	Mean						
	σ						
	Number	11	2	-	1	1	6
Adult woman only	Mean						
	σ						
	Number	6	2	-	1	1	3
Adult man and woman	Mean	321 052	480 886	158 087	161 074	197 353	224 323
	σ	546 499	853 715	203 774	173 042	339 915	233 191
	Number	605	143	26	162	61	295

σ = Standard deviation
** Outliers, including values that are too high for the series and have not been taken into account for the calculation of averages.
Source: IPAR, Naatal Mbay Baseline Study, 2015

Table 42: Average Values of Rice Sales by Season (households having sold on the SRV market)

	[River Valley] - HOS irrigated rice	[River Valley] - RS irrigated rice
Mean	513 032	185 366
Std dev.	738 690	169 784
Number	97	70

Source: IPAR, Naatal Mbay Baseline Study, 2015

Average marketing revenues amount to CFAF 70,642 across the total sample and CFAF 319,039 in the sub-

sample of households having sold some of their production. Revenues from irrigated rice in the SRV are higher than those from the other value chains. Millet (CFAF 71,086) and maize (CFAF 58,371) from the SGB rank second and third respectively in terms of revenues. Casamance (maize and rain-fed rice) reports the lowest sales revenues.

Table 43: Average Sales Revenues of All Households

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	70 642	225 463	1 793	58 371	17 605	71 086
	Std dev.	254 726	568 616	11 563	108 109	79 547	121 833
	Number	1 931	286	480	353	505	578
Household type							
Adult man only	Mean	33 367					
	Std dev.	67 014					
	Number	29	3	13	1	8	7
Adult woman only	Mean	75 213					
	Std dev.	307 768					
	Number	23	2	8	3	6	6
Adult man and woman	Mean	71 162	223 201	1 875	58 705	17 786	71 165
	Std dev.	255 898	568 419	11 819	108 638	80 453	122 636
	Number	1 879	281	459	349	491	565

Source: IPAR, Naatal Mbay Baseline Study, 2015

7.3. Use of Promoted Technologies and Management Practices

Working toward a significant improvement of farming productivity, the project seeks to promote various improved technologies in order to increase yields in the target value chains. To this end, a technical itinerary consisting of a sequence of management practices has been determined for each target crop. Results show that 99.6% of households include at least one farmer who applied at least one improved technology promoted by the project.

Table 44: Farmers Having Implemented an Improved Technology or Management Practice Within Households

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	1,18	1,02	1,44	1,19	1,37	1,15
	σ	0,49	0,19	0,69	0,51	0,67	0,46
	Number	1931	286	480	353	505	578
Household type							
Adult man only	Mean	1,10					
	σ	0,31					
	Number	29	3	13	1	8	7

Adult woman only	Mean	1,04					
	σ	0,21					
	Number	23	2	8	3	6	6
Adult men and women	Mean	1,18	1,02	1,46	1,19	1,37	1,15
	σ	0,49	0,19	0,70	0,51	0,68	0,46
	Number	1879	281	459	349	491	565

σ = Standard deviation
Source: IPAR, Naatal Mbay Baseline Study, 2015

Some improved technologies and management practices such as the ones related to seeding are more widespread. Fertilization (85.3%) and soil preparation (63.8%) are the second and third most used. Capacity-building through training sessions (1.4%) and agricultural insurance subscriptions (1%) reach the lowest percentage of households. The importance of these practices varies according to zones and crops. For irrigated rice in the SRV (Delta and Middle Valley), soil preparation technologies have the highest percentage of users, followed by fertilization.

In the SRV, the low percentages recorded for seeding practices is due to the fact that the seed drill, the technology promoted by the project, is not customarily used in the North. In Casamance, the rain-fed rice-farming displays a predominance of technologies relating to fertilizations first, then soil preparation. In the maize and millet value chains, the use of certified seeds has the highest percentages in each of the concerned zones (SGB and Casamance).

7.4. Surface Areas Concerned by the Use of Improved Technologies and Management Practices

Sown areas benefiting from the application of an improved technology or farming practice constitute a relatively large area in all zones and for all target crops, with the exception of irrigated rice in the SRV. This crop has the lowest total surface area under improved technologies or management practices out of all the zones and crops. This might be due to the fact that in the SRV, irrigated rice is farmed over small areas. Moreover, relatively high standard deviations point to the existence of large disparities within each zones.

Table 45: Number of Hectares by Type of Household Implementing Improved Technologies or Management Practices (Indicator 5)

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	5,96	3,71	5,92	8,80	7,94	7,40
	σ	8,13	11,18	7,21	8,42	8,99	7,74
	Number	1931	286	480	353	505	578
Household type							
Adult man only	Mean	4,04					
	σ	3,43					
	Number	29	3	13	1	8	7
Adult woman	Mean	3,11					
	σ	3,18					

only	Number	23	2	8	3	6	6
Adult men and women	Mean	6,03	3,72	6,01	8,83	8,02	7,47
	σ	8,21	11,27	7,34	8,43	9,09	7,79
	Number	1879	281	459	349	491	565

Source: IPAR, Naatal Mbay Baseline Study, 2015

Globally and across all zones, the areas where a technology or management practice is implemented are relatively small in comparison to the total sown area. Across the sample, out of an average total sown area of 4.71 ha, the fertilization technology is implemented on an average of 1.81 ha, a larger surface area than the ones occupied by the other technologies. Then follows the use of certified seeds (1.67 ha), and the soil preparation technology (1.38 ha). The other technologies are applied across very small areas.

Table 46: Number of Hectares Sown by Households Implementing Improved Technologies or Management Practices (Indicator 5)46

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total area sown by household	Mean	4,71	1,81	4,24	8,15	5.77	7,01
	σ	5,03	4,38	4,65	5,36	5,51	5,09
	Number	1931	286	480	353	505	578
Soil Preparation	Mean	1,38	1,42	1,76	1,65	1,83	1,29
	σ	2,53	3,31	2.5	2,76	3,01	2,46
	Number	1931	286	480	353	505	578
Certified seeds	Mean	1,67	0,02	1,11	3,59	2,21	3,02
	σ	2,39	0,19	1,68	2,99	2,63	2,7
	Number	1931	286	480	353	505	578
Fertilization	Mean	1,81	1,36	2,09	1,94	2,42	1,71
	σ	2.5	3,31	2,38	2,38	2,6	2.2
	Number	1931	286	480	353	505	578
Storage	Mean	0,05	0,35	0	0	0	0
	σ	1,1	2,84	0	0	0	0
	Number	1931	286	480	353	505	578
Training	Mean	0,07	0,49	0,01	0	0	0
	σ	0,91	2,31	0,09	0	0	0
	Number	1931	286	480	353	505	578

Source: IPAR, Naatal Mbay Baseline Study, 2015

7.5. Accessing and Using Agro-climatic Information

Access and use are two different levels of the interaction between agro-climatic information and farmers.

More than a third of households count at least one member who has access to agro-climatic information. Depending on the zone, the proportion of households having access to agro-climatic information is relatively

high for SGB-maize (52%) and SGB-millet (51%) whereas percentages are lower for Casa-maize (30%) and SRV-irrigated rice (25%). We find that SRV-irrigated rice shows the lowest level of access. This could be explained by the fact that in that zone, the production system is essentially irrigation-based.

Of the households having access to agro-climatic information, 78% reported having used it to select crop types for the farming year. The proportion of households using agro-climatic information to select crops exceeds the majority in all zones and value chains: 61% for SRV-rice, 85% and 73% for maize in the SGB and Casamance respectively, 82% for rain-fed rice in Casamance, and 83% for millet in the SGB.

Table 47: Use of Climate Information: Selecting Crop Types (Indicator 7)

	Total sample		[SRV] – Irrigated rice		[Casa] – Rain-fed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
	Nb	Col %	Nb	Col %	Nb	Col %	Nb	Col %	Nb	Col %	Nb	Col %
Presence of a member having access to agro-climatic information												
No	1252	64,8%	215	75,2%	320	66,7%	170	48,2%	355	70,3%	285	49,3%
Yes	679	35,2%	71	24,8%	160	33,3%	183	51,8%	150	29,7%	293	50,7%
Total	1931	100,0%	286	100,0%	480	100,0%	353	100,0%	505	100,0%	578	100,0%
Use of Agro-climatic Information to Select Crop Types (long cycle or short cycle)												
No	150	22,1%	28	39,4%	29	18,1%	28	15,3%	41	27,3%	49	16,7%
Yes	529	77,9%	43	60,6%	131	81,9%	155	84,7%	109	72,7%	244	83,3%
Total	679	100,0%	71	100,0%	160	100,0%	183	100,0%	150	100,0%	293	100,0%

Source: IPAR, Naatal Mbay Baseline Study, 2015

Table 48: Use of Climate Information by Household Type

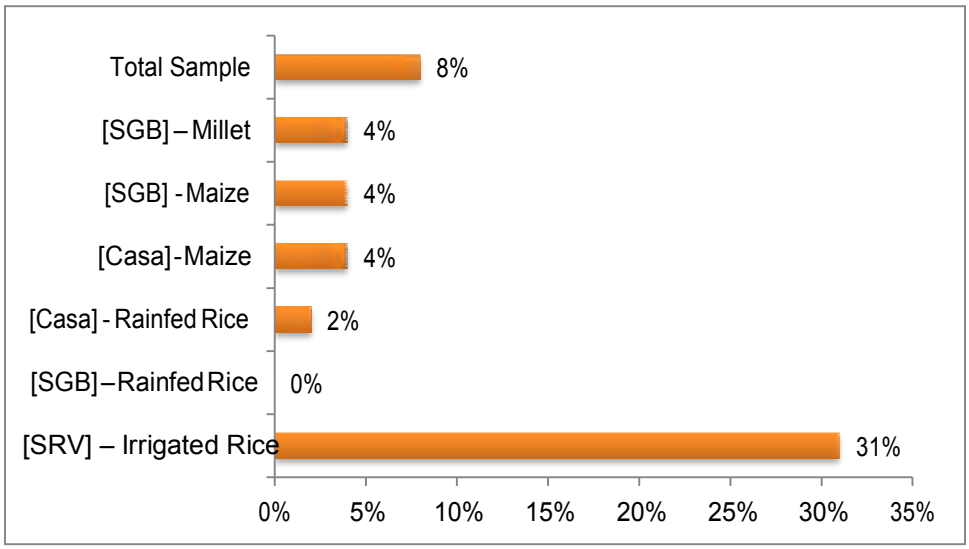
		Total sample	[SRV] – Irrigated rice	[Casa] – Rain- fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	0,78	0,61	0,82	0,85	0,73	0,83
	σ	0,42	0,49	0,39	0,36	0,45	0,37
	Number	679	71	160	183	150	293
Household type							
Adult man only	Mean						
	σ						
	Number	11	0	7	1	5	3
Adult woman only	Mean						
	σ						
	Number	6	0	1	0	3	2
Adult man and woman	Mean	0,77	0,61	0,81	0,85	0,71	0,83
	σ	0,42	0,49	0,39	0,36	0,45	0,37
	Number	662	71	152	182	142	288

Source: IPAR, Naatal Mbay Baseline Study, 2015

7.6. Agricultural and Rural Loans

Survey results show that formal credit in the form of cash loans for rice, maize or millet production concern only 8% of households across the total sample. This proportion varies according to the zone and target crop: 31% for SRV-irrigated rice, 2% for Casa-rain-fed rice, and 4% each for SGB-maize, Casa-maize, and SGB-millet. In the SRV, irrigated rice-farming is better integrated into the financial market in comparison with rain-fed corps in other zones.

Chart 2: Level of Access to Formal Loans for Rice, Millet or Maize Farming



Source: IPAR, Naatal Mbay Baseline Study, 2015

The average value of the loans per beneficiary household amounts to CFAF 246,780 and varies according to the zone and crop. For irrigated rice in the SRV the average loan is CFAF 279,941 against CFAF 120,375 for rain-fed rice in Casamance, and CFAF 260,500 and CFAF 181,952 for maize in the SGB and Casamance respectively.

Table 49: Value of Agricultural and Rural Loans in CFAF (indicator n°12)

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain- fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
		Total loans	Rice loans	Rice loans	Maize loans	Maize loans	Millet loans
Total sample	Mean	246 780	279 941	120 375	260 500	181 952	153 095
	Std dev.	236 449	238 302	94 004	230 841	212 079	86 393
	Number	158	90	- 8	15	21	21
	Minimum	12 500	12 500	25 000	62 500	15 000	25 000
	Maximum	1 500 000	1 260 000	300 000	850 000	750 000	300 000

Source: IPAR, Naatal Mbay Baseline Study, 2015

Table 50: Value of Agricultural and Rural Loans by Area of Influence (CFAF)

Zones	Nb	Mean	Std dev.	Standard	95% confidence interval for the mean	Minimum	Maximum

	Households			error	Lower boundary	Upper boundary		
SRV	90	279 941	238 302	25 119	230 029	329 852	12 500	1 260 000
SGB	36	197 847	168 713	28 119	140 763	254 931	25 000	850 000
Casamance	32	208 563	283 716	50 154	106 272	310 853	15 000	1 500 000
Total	158	246 780	236 449	18 811	209 624	283 935	12 500	1 500 000

Source: IPAR, Naatal Mbay Baseline Study, 2015

7.7. Agricultural Insurance

Three different types of insurance are listed: conventional agricultural insurance, which is mostly used in the SRV, and index-based insurance and satellite-based insurance in the SGB and Casamance. Overall, 5% of the sample households have at least one member having taken out an insurance policy. This proportion is roughly similar in all zones according to the zone and target crop.

Table 51: Households with at Least One Farmer with an Agricultural Insurance Policy (indicator 14)

Agricultural Insurance	Total sample		[SRV] – Irrigated rice		[Casa] – Rain-fed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
	Nb	% col	Nb	% col	Nb	% col	Nb	% col	Nb	% col	Nb	% col
No	1842	95%	266	95%	442	95%	331	95%	471	95%	535	95%
Yes	89	5%	15	5%	23	5%	19	5%	23	5%	31	5%

Nb=Number (size)

Source: IPAR, Naatal Mbay Baseline Study, 2015

Table 52: Average Number of Farmers with Agricultural Insurance

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	1,17	1,07	1,35	1,05	1,43	1,06
	σ	0,48	0,26	0,71	0,23	0,79	0,25
	Number	89	15	23	19	23	31

Source: IPAR, Naatal Mbay Baseline Study, 2015

7.8. Marketing Contracts

A marketing contract is defined here as a production purchase agreement made prior to the harvest. This agreement may be written or oral depending on the relationship of trust built between the two parties and the current practices specific to each zone.

A small proportion of households have members having benefited from a marketing contract (2%) and this percentage remains similar for each zone and target crop. On average, farmers collaborate with 2 or 3 buyers.

Table 53: Households with at least One Farmer Benefiting from a Marketing Contract

Contract	Total sample		[SRV] – Irrigated rice		[Casa] – Rain-fed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
	Nb	% col	Nb	% col	Nb	% col	Nb	% col	Nb	% col	Nb	% col
No	1899	98%	279	98%	471	98%	345	98%	494	98%	567	98%
Yes	32	2%	7	2%	9	2%	8	2%	11	2%	11	2%

Source: IPAR, Naatal Mbay Baseline Study, 2015

Table 54: Number of Buyers Having a Contract with Household Farmers (indicator 15)

		Total sample	[SRV] – Irrigated rice	[Casa] – Rain- fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	2,53					
	σ	1,48					
	Number	32	7	9	8	11	11

Source: IPAR, Naatal Mbay Baseline Study, 2015

7.9. Quantities Produced by Farming Households

On average, farming households produce 2,235kg of cereals (millet, maize and rice) although there are large variations between zones. For irrigated rice in the SRV, the production volume is 5,073 kg, while in the SGB, production quantities are 1,816 kg for millet and 1.098 kg for maize. The lowest averages were recorded for maize and rain-fed rice in Casamance.

Table 55: Production Volumes by Targeted Value Chain in kg (indicator 16)

Production volumes (kg)		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	2 235	5 073	601	1 098	922	1 816
	σ	3 791	6 557	748	1 379	1 719	2 128
	Number	1 926	282	479	353	504	578
Household type							
Adult man only	Mean	1 403					

Production volumes (kg)		Total sample	[SRV] – Irrigated rice	[Casa] – Rain-fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
	σ	1 960					
	Number	29	3	13	1	8	7
Adult woman only	Mean	1 888					
	σ	5 677					
	Number	23	2	8	3	6	6
Adult man and	Mean	2 252	5 011	600	1 105	937	1 834
	σ	3 784	6 455	745	1 384	1 739	2 146

woman	Number	1 874	277	458	349	490	565	

Source: IPAR, Naatal Mbay Baseline Study, 2015

7.10. Farmers Access to Loans via Networks and Organizations

Only 4% of the households include farmers having access to a loan via a network or organization to which they belong. This proportion varies greatly according to the zone and target crop. They are 14% for SRV-irrigated rice, 6% for SGB-maize, 5% for SGB-millet, and 2% each for rain-fed rice and maize in Casamance.

Table 56: Distribution of Households with Farmers Having Access to Loans via their Organizations

	Total sample		[SRV] – Irrigated rice		[Casa] - Rain fed rice		[SGB] - Maize		[Casa] - Maize		[SGB] - Millet	
	Nb	% col	Nb	% col	Nb	% col	Nb	% col	Nb	% col	Nb	% col
No	1852	96%	246	86%	472	98%	333	94%	496	98%	551	95%
Yes	79	4%	40	14%	8	2%	20	6%	9	2%	27	5%

Source: IPAR, Naatal Mbay Baseline Study, 2015

Table 57: Average Number of Farmers Having Access to Loans via their Organizations

		Total sample	[SRV] – Irrigated rice		[Casa] - rain fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
Total sample	Mean	1,06	1,13			1,00		1,00
	σ	0,29	0,40			-		-
	Number	79	40		8	20	9	27
Household type								
Adult man only	Mean			.	.	.	.	.
	σ			.	.	.	.	.
	Number	1,00	1,00	-	-	-	-	-
Adult woman only	Mean			.	.	.	.	.
	σ			.	.	.	.	.
	Number	1	1	-	-	-	-	-
Adult man and woman	Mean	1,06	1,13			1,00		1,00
		Total sample	[SRV] – Irrigated rice		[Casa] - rain fed rice	[SGB] - Maize	[Casa] - Maize	[SGB] - Millet
	σ	0,30	0,41		-	-	-	-
	Number	77	38		8	20	9	27

Source: IPAR, Naatal Mbay Baseline Study, 2015

APPENDIX A: INDICATORS CALCULATION METHOD

Indicator number	Indicator name	How will indicator be calculated	Disaggregation
1	Gross margin per hectare, animal or cage of selected product (crops/animals selected varies by country)	Gross margin per ha = [(TP x VS/QS) – IC] / UP	Commodity, gender
	1.Total Production by direct beneficiaries during reporting period (TP)	Exclude all parcels for which data is not available for all five data points. Create a variable for each of the data points (TP, etc.) for each crop x household. Sum these data points across all households (for each crop) for data that will be fed into formula. Further, conduct separate analyses by gender.	
	2. Total Value of Sales (USD) by direct beneficiaries during reporting period (VS)	Disaggregate by commodity, and by gender within each commodity disaggregation.	
	3. Total Quantity (volume) of Sales by direct beneficiaries during reporting period (QS)	Convert as needed to report as $/ha.	
	4. Total Recurrent Cash Input Costs (USD) of direct beneficiaries during reporting period (IC)		
	5. Total Units of Production: Hectares planted for direct beneficiaries during the production period (UP)		
2	Value of incremental sales (collected at farm- level) attributed to FTF implementation	Aggregate volume for each crop x household (this is equivalent to QS in the gross margin indicator). Sum across households to report indicator.	Commodity
		Aggregate value for each crop x household (this is equivalent to VS in the gross margin indicator). Sum across households to report indicator.	
3	Number of farmers and others who have applied new technologies or management practices as a result of USG assistance	For each practice specified in section J (e.g. J05, variety planted), determine which options are "improved" or not.	Technology type, commodity, gender, new/continui ng
		For each practice, generate a variable for each question which is 0 if not improved and 1 if improved on a particular parcel for a particular crop.	

		Classify practices by category (see PIRS, for example crop genetics, cultural practices, etc.) and generate a variable for each category that is 0 if no improved practice is used and 1 if one or more improved practices are used. This variable is used to report the indicator that is disaggregated by type of practice.	
		Generate an "improved" variable that is 0 if all category variables are 0 and 1 if any category variable is 1. Sum this across households for indicator value.	
	Crop genetics		
	Cultural practices		
	Pest management		
	Disease management		
	Soil fertility and conservation		
	Irrigation		
	Water management		
	Climate mitigation or adaptation		
	Marketing and distribution		
	Post-harvest handling and storage		
	Value-added processing		
	Other		
4	Number of private enterprises, producers organizations, water users associations, women's groups, trade and business associations and community- based organizations (CBOs) that applied new technologies or management practices as a result of USG assistance	N/A	
5	Number of hectares under improved technologies or management practices as a result of USG assistance	Create a new set of variables by multiplying the second set of variables developed above by the area of each parcel on which they are applied. Calculate the aggregate variable by aggregating the parcel areas where at least one improved technology was applied.	Technology type, commodity, gender, new/continuing
	Crop genetics		
	Cultural practices		
	Pest management		

	Disease management		
	Soil fertility and conservation		
	Irrigation		
	Water management		
	Climate mitigation or adaptation		
	Other		
6	Number of stakeholders using climate information in their decision making as a result of USG assistance	Determine which types of information in Section F are considered "climate info" (all?), then create a single variable that is 0 if all are 0, and 1 if any are 1. Aggregate the results to get a number of stakeholders. This result reports the same indicator as the "climate mitigation and adaptation" disaggregation for the "improved technologies and management practices" indicator.	gender
7	Number of stakeholders implementing risk-reducing practices/actions to improve resilience to climate change as a result of USG assistance	It is necessary to determine what constitutes a risk- reducing practice in the context of the pilot. Aggregate number of farmers adhering to those practices.	type of risk reducing practice (see M&E plan p.50-51), gender
8	Number of rural households benefiting directly from USG interventions	Sum those that reported participating in PCE, baseline will be zero for NM.	New/continuing
9	Number of individuals who have received USG supported short-term agricultural sector productivity or food security training	This will be zero at baseline for Naatal Mbay.	Type of individual (see M&E Plan p.53-54), gender
10	Number of members of producer organizations and community based organizations receiving USG assistance	Create a variable that sums unique household members that participate in a CN. Sum	Type of organization, sex
		this number across households for the indicator.	

11	Number of vulnerable households benefiting directly from USG interventions	Based on standard definitions of vulnerability as well as discussions in August, a vulnerable household is one with a) a single (male or female) headed household, b) youth household head, c) household dependent on agriculture (I suggest a cut- off of >50%) for livelihood. Sum those that reported participating in PCE, baseline will be zero for NM.	New/continuing, gendered household type
12	Value of Agricultural and Rural Loans	Sum the value of credit received that meet the following two criteria: lending agency is a formal lender (K11), and loan is monetary rather than in-kind (K12).	Type of loan recipient (see M&E plan p.57)
13	Number of jobs attributed to FTF implementation	N/A	
14	Number of people with an insurance policy as a result of USG assistance	Count number of unique individuals per household with a parcel insured. Report for PCE baseline but NM value will be zero at baseline.	Savings/insurance account, sex of account holder (male, female, joint)
15	Number of producer-consolidator linkages established/expanded and effectively working.	Baseline value will be zero for NM however the number of buyers provides a value against which change will be calculated.	Commodity, gender
16	Total production of USG-targeted commodities.	Indicator value is equal to "TP" from the gross margins indicator.	Commodity, gender
17	Number of MSMEs, including farmers, receiving USG assistance to access loans	Baseline value will be zero for NM however the number of buyers provides a value against which change will be calculated.	Size of MSME, sex
18	Number of community service providers established	N/A	
19	Number of public-private partnerships formed as a result of FTF assistance	N/A	

20	Total public and private dollars leveraged with USG support for logistics and processing infrastructure projects.	N/A	
21	Number of firms (excluding farms) or CSOs engaged in agricultural and food security-related manufacturing and services now operating more profitably (at or above cost) because of USG assistance	N/A	
22	Value of new private sector investment in the agriculture sector or food chain leveraged by FTF implementation	N/A	
23	Number of food security private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) receiving USG assistance	N/A	
24	Number of MSMEs, including farmers, receiving business development services from USG assisted sources	Count all farmers reporting participation in PCE. Baseline value for NM will be zero.	
25	Numbers of Policies/Regulations/Administrative Procedures in each of the following stages of development as a result of USG assistance in each case:	N/A	
A	Score, in percent, of combined key areas of organization capacity amongst USG direct and indirect local implementing partners	N/A	
B	Number of organizations showing performance improvements as reflected by increases in organization capacity scores	N/A	
C	Number of awards made directly to local organizations	N/A	
D	Number of organizations that qualify for direct USAID funding	N/A	
E	Proportion of female participants in USG-Assisted programs designed to increase access to productive economic ressources	Calculate share of farmers in indicator 24 (MSMEs receiving BDS) that are female.	
W	Score on Women's Empowerment in Agriculture Index (WEAI)	TBD	

APPENDIX B: BASELINE DATA ANALYSIS GUIDANCE FOR POVERTY VARIABLE

The USAID poverty line for Senegal is US$1.25/day (anyone at or below $1.25 a day is classified as "very poor"). Anyone above $1.25/day is classified as "not very poor". This is equal to 421.92 in 2009 CFA.

Determining household-level poverty status requires three steps: First, creation of needed variables using the survey data; second, calculate household consumption using variables and the coefficients that are provided for them; and third, categorization of households as "very poor" or "not very poor" on the basis of the results.

It should be noted that the poverty score is not intended for use at an aggregate rather than household level, so we must be very careful in our interpretation of results. For example, we could use the results to generalize what proportion of the baseline sample is very poor, and later we might use the results to generalize about poverty outcomes among project affected households compared to those that don't participate, but we should not use the results to identify individual households as poor or not very poor.

Create needed variables using the survey data

The table below provides instructions on how to calculate each variable needed to calculate poverty.

Variable	Suggested variable name	Data source	Instructions to create variable
Household size	hhsize	C12	Sum male and female for household size
Household head age	C02	C02	N/A (variable already exists)
Household lives in rural area			N/A because sample selection targeted only rural households
Household lives in Diourbel	diour	A02	=1 if household lives in Diourbel =0 otherwise
Household livesin Fatick	fatic	A02	=1 if household lives in Fatick =0 otherwise
Household livesin Kaolack	kaola	A02	=1 if household lives in Kaolack =0 otherwise
Household livesin Kolda	kolda	A02	=1 if household lives in Kolda =0 otherwise
Household lives in Louga	louga	A02	=1 if household lives in Louga =0 otherwise
Household livesin Matam	matam	A02	=1 if household lives in Matam =0 otherwise
Household lives in Saint Louis	saint	A02	=1 if household lives in Saint Louis =0 otherwise
Household lives inTambacounda	tamba	A02	=1 if household lives in Tambacounda =0 otherwise
Household livesin Thies	thies	A02	=1 if household lives in Thies =0 otherwise

Household lives inZinguinchor	zingu	A02	=1 if household lives in Zinguinchor =0 otherwise
Dependency ratio	depen	C07-C10	Sum household members (male and female) under age 16 and over age 64 (C07, C09, C10); divide by sum of household members between age 16 and 64 (C08)
Wall is made of banco bricks	wall	D02	=1 if D02 = 2 =0 otherwise
Roof is made of thatch/straw	thatch	D03	=1 if D03 = 3 = 0 otherwise
Roof is made of concrete/cement	concrete	D03	=1 if D03 = 4 =1 if D03 = 6 =0 otherwise
Toilet type is toilet with sewage	toilet	D04	=1 if D04 = 2 =0 otherwise
Garbage disposed by burying it	waste	D05	= 1 if D05 = 3 =0 otherwise
Number of chairs owned	E01a	E01.a	N/A (variable already exists)
Number of computers owned	E02a	E02.a	N/A (variable already exists)
Number of artisanal machetes owned	E08a	E08.a	N/A (variable already exists)
Household (HH) owns one or more tables	E03	E03	N/A (variable already exists)
HH owns one or more sofas	E04	E04	N/A (variable already exists)
HH owns one or more fans	E05	E05	N/A (variable already exists)
HH owns one or more refrigerators	E06	E06	N/A (variable already exists)
HH owns one or more cars	E07	E07	N/A (variable already exists)
HH owns one or more cattle	E09	E09	N/A (variable already exists)

Calculate household consumption score

Calculate the score for each household using the following equation:

Score = 7.1699 – (0.0606 * hhsize) + (0.0006* hhsize^2) – (0.0025*C02) - (0.2834*diour) – (0.0344*fatic) – (0.0060* kaola) – (0.4373*kolda) – (0.1378*louga) – (0.1902*matam) – (0.0032*saint) – (0.2071*tamba) – (0.1264*thies) – (0.2452*zingu) – (0.0914*depen) – (0.0872*wall) – (0.2172*thatch) + (0.2034*concrete) + (0.1833*toilet) – (0.1296*waste) + (0.0127*E01a) + (0.0998*E02a) + (0.0627*E08a) + (0.1061*E03) + (0.1589*E04) + (0.1720*E05) + (0.1973*E06) + (0.2461*E07) + (0.1692*E09)

Classify households as "very poor" or "not very poor"

The output of the above equation (score) is equal to the log of household consumption in 2009 CFA. You must take its inverse log in order to convert it to a score that can be interpreted relative to the poverty line.

In SPSS, the formula would be: COMPUTE consumption=EXP (score).

Then calculate a variable for poverty using the following rule:

Poor = 1 if consumption > 421.92
=0 if consumption <= 421.92

Where 1 means a household is very poor, and 0 means a household is not very poor.

References

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USAID PAT Manual, Chapter 6 (English, Spanish & French)
http://povertytools.org/implementation.html

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