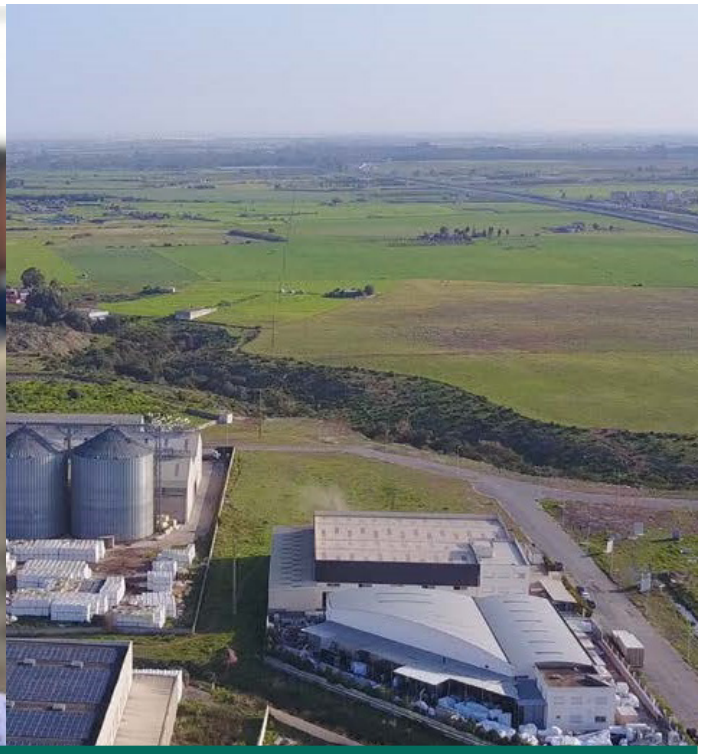

Morocco Land Productivity Project Evaluation

Baseline Report

November 30, 2023

Anthony Harris, Sara Litke-Farzaneh, Faraz Usmani, Elena Moroz, Rachel Sander, Sarah Leser, Hailey Hannigan, and Matt Sloan

Submitted to:

Millennium Challenge Corporation
1099 Fourteenth Street, NW, Suite 700
Washington, DC 20005
Project Officer: Shauna Clarke
Contract Number: 95332418F045

Submitted by:

Mathematica
1100 First Street, NE, 12th Floor
Washington, DC 20002-4221
Phone: (202) 484-9220
Fax: (202) 863-1763
Project Director: Matt Sloan
Reference Number: 50724.BY.T02.270.000

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Acronyms

ANCFCC	*Agence Nationale de la Conservation Foncière du Cadastre et de la Cartographie* (National Agency of Land Registry, Cadastre, and Cartography)
ANLCA	*l'Agence Nationale de Lutte Contre l'Analphabétisme* (National Agency to Combat Illiteracy)
CEILD	Center of Expertise for Industrial Land Development
EC	ethnic collective
EDR	evaluation design report
ERR	economic rate of return
ESP	environmental and social performance
EQ	evaluation question
FDI	foreign direct investment
FGD	focus group discussion
FONZID	*Fonds des Zones Industrielles Durables* (Sustainable Industrial Zones Fund)
GDP	gross domestic product
GIS	geographic information system
GoM	Government of Morocco
GSI	gender and social inclusion
ha	hectares
HML	Health Media Labs
IFPRI	International Food Policy Research Institute
IRB	institutional review board
IZ	industrial zone
KII	key informant interview
M&E	monitoring and evaluation
MCA-M	Millennium Challenge Account-Morocco
MCC	Millennium Challenge Corporation
MoA	*Ministère de l'Agriculture* (Ministry of the Agriculture)
MoI	*Ministère de l'Intérieur* (Ministry of the Interior)
MIC	*Ministère de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numérique* (Ministry of Industry, Trade, Investment, and the Digital Economy)

NDVI	Normalized Difference Vegetation Index
NST	*NOVEC/SAFTOP/TAOUHID* (Implementer of the Rural Land Activity)
ONCA	*Office National du Conseil Agricole* (National Agricultural Advisory Board)
ORMVA	*Office Régional de Mise en Valeur Agricole* (The Regional Office for Agricultural Development)
ORMVAG	*Office Régional de Mise en Valeur Agricole du Gharb* (The Regional Office for Agricultural Development of Gharb)
ORMVAH	*Office Régional de Mise en Valeur du Haouz* (The Regional Office for Agricultural Development of Haouz)
PPP	public-private partnership
RNA	*Recensement National Agricole* (National Agricultural Registry)
RQ	research question
SEZ	special economic zone
SME	*Superficie minimum d'exploitation* (minimum agricultural surface area)
SRD	Spatial regression discontinuity
TA	technical assistance
UNIDO	United Nations Industrial Development Organization
VIIRS	Visible Infrared Imaging Radiometer Suite
WEAI	Women's Empowerment in Agriculture Index

Executive Summary

The Morocco Employability and Land Compact and the Land Productivity Project

This report presents the baseline evaluation for an independent evaluation of the $169.5 million Land Productivity Project created by the Government of Morocco (GoM) and sponsored by the Millennium Challenge Corporation (MCC) and Millennium Challenge Account Morocco (MCA-M), as part of a $450 million compact agreement (MCC 2015). The report centers around two of the three key project activities:

The **Rural Land Activity** ($30.3 million) was designed to develop a faster and more inclusive process for delivering individual (or co-owned) land titles to smallholder farmers[1] who currently farm on irrigated collective land (through a process called *melkisation)*. Providing titles for formerly collective land would allow individuals the right to buy or sell land, or use land as collateral for loan applications, thereby providing the necessary security, stability, and incentives to increase investment and agricultural productivity. The activity was intended[2] to be implemented on 51,000 hectares (ha) of collective land in the Gharb region and 15,000 ha of collective land in the Haouz region.

The **Industrial Land Activity** ($131.4 million) was designed to pilot a new market-driven public-private partnership (PPP) approach to industrial zone (IZ) development and rehabilitation. Technical capacity-building assistance was to be provided through the creation of a Center of Expertise for Industrial Land Development (CEILD), and three demonstration sites were to be piloted in the Casablanca-Settat Region (Had Soualem, Bouznika, and Sahel Lakhyayta). Finally, a Fund for Sustainable Industrial Zones (FONZID) was to be developed to support projects that improve the governance and sustainability of existing or new industrial zones.

Evaluation questions, data sources and methodology

The evaluation of the Land Productivity Project will address two evaluation questions (EQs):

> **EQ1.** To what extent was the project implemented according to plan (in terms of quantity and quality of outputs)?
>
> **EQ2.** Did the project achieve its stated objective in the time frame and magnitude expected, as documented in the Monitoring and Evaluation (M&E) Plan? Why or why not?

We will address EQ1 through an implementation analysis (to be incorporated into the endline report), and EQ2 through a mixed-methods impact evaluation of the Rural Land Activity; and a mixed-methods performance evaluation of the Industrial Land Activity (**Table ES.1**).

[1] We use the term "farmers" throughout the report to refer broadly to anyone who farms collective land; regardless of their land tenure status.

[2] The signed compact agreement (MCC 2015) specified that the MCA-M optimized *melkisation* procedure was to be implemented on a pilot basis with 46,000 ha of land. Subsequently, the activity was expanded to include more land in Gharb, a second region (Haouz) and several accompanying measures to the land titling exercise, for a total of 66,00 ha.

Table ES.1. Evaluation questions, methods, and data sources

EQ	Rural Land Activity evaluation		Industrial Land Activity Evaluation	
	Methods	Data sources	Methods	Data sources
EQ1	Implementation analysis: Qualitative and descriptive analyses of inputs and outputs	Project documentation Key informant interviews Focus group discussions	Implementation analysis: Qualitative and descriptive analyses of inputs and outputs	Project documentation Key informant interviews
EQ2	Mixed-methods impact evaluation: qualitative and descriptive analyses of outcomes, combined with a quantitative analysis utilizing a matched comparison design	Farmer survey Crop cut survey Remote sensing data Key informant interviews Focus group discussions	Mixed-methods performance evaluation: Quantitative trend analysis Benchmarking analysis Qualitative and descriptive analyses of outcomes	Project documentation Ministry of Industry (MIC) zone-level database Daytime satellite imagery (Sentinel-2) Nighttime lights satellite imagery (VIIRS)

These evaluations identify key outcomes (objectives) in the logic models (**Figures I.1. and I.2.** in the following section) to be measured over time, as shown in **Table ES.2**. While the endline evaluation will measure the effects of the Project on these key outcomes, this baseline evaluation seeks rather to establish baseline (reference) values for these outcomes and validate whether the program has been designed to address the needs of the population at baseline.

Table ES.2. Key objectives (outcomes) to be measured in the evaluation, and their link to the program logic

Objective / outcomes	Link to program logic
Rural Land Activity *Our evaluation will assess whether the following key outcomes materialize due to the provision of melk land titles:*	
Improved land tenure security	Giving landowners private titles that verify their land ownership is expected to increase the security of these newly formalized rights, reduce the number of land conflicts, and improve perceptions of tenure security.
More dynamic land market	Rightsholders[3] will be able to legally sell, rent out, or transfer newly titled *melk* land (unlike collective land), which is expected to lead to greater and more efficient land transactions.
Improved access to credit	Increased access to and lower cost of financing is expected to be achieved by enabling farmers to use privately held land as collateral for loan applications.
Increased investment in inputs and modernized agricultural techniques	Land titles are expected to incentivize farmers to invest in the productivity of their land through inputs and modern techniques.
Increased productivity of formerly-collective rural land	Increased investments in agricultural inputs and techniques is expected to improve agricultural productivity.
Increased household income	The better valorization of agricultural land, the greater productivity of land, and the increased agricultural profits are all expected to increase household income.
Industrial Land Activity *Our evaluation will assess whether the following key outcomes materialize due to the introduction of a new demand-driven model for industrial zones:*	
Increased efficiency, transparency, and equity in the process of IZ development/revitalization	Technical assistance for the development of a new IZ legal framework is expected to improve the process of IZ development, revitalization and management.
Increased private-sector involvement in development of zones	The development of IZ standards and practices is expected to support market-driven IZ development, reduce incentives for use of industrial land for unproductive or speculative purposes, and ensure a closer match between the supply of and demand for industrial land.

[3] A rightsholder or "*ayant droit*" in French is a collectivist (member of an ethnic community) located within an irrigated perimeter, who holds a potential right to a collective land "mother title" of that ethnic community, and whose name is published in the list of rightsholders in the Official Bulletin. This definition is also included in Table B.5 in Annex B.

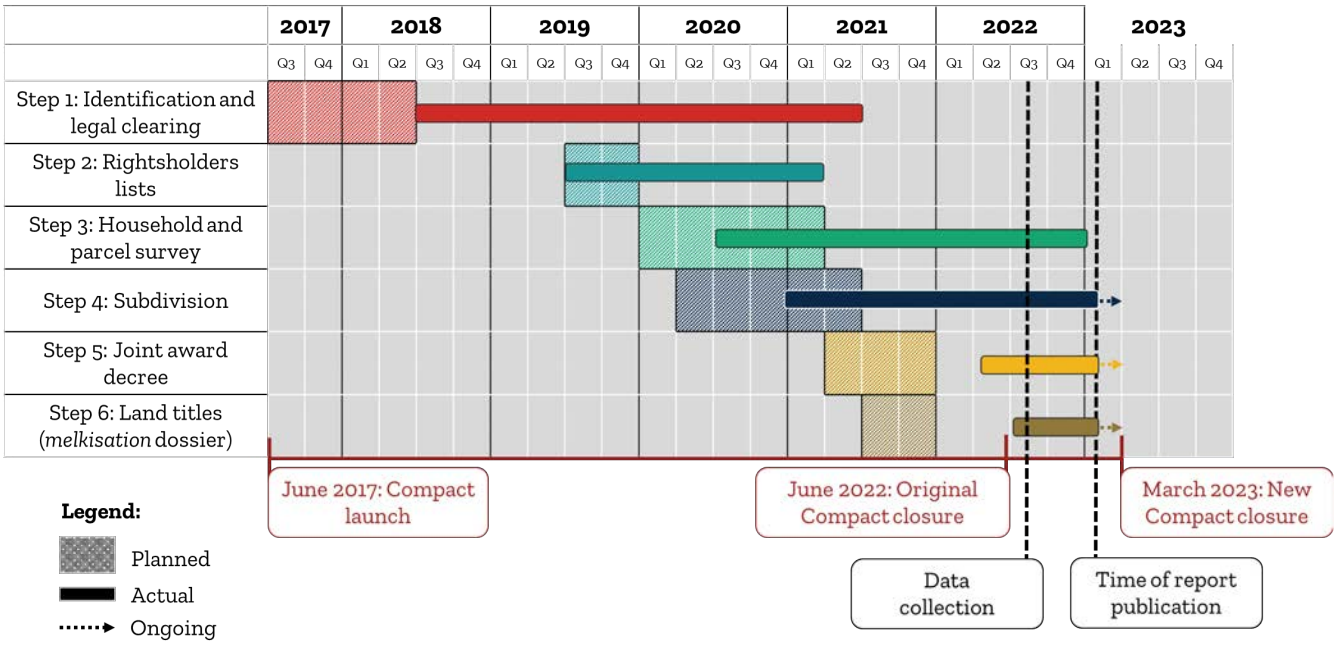
Objective / outcomes	Link to program logic
Increased private-sector involvement in IZ management, maintenance and operation	Increasing private-sector involvement is expected to result in the provision of better and more reliable services that are more responsive to the needs of zone-level firms, thereby improving zone performance and fostering higher demand for industrial land.
Increased private investment of industrial firms	Developing IZs in a way that is demand-driven and responsive to the needs of potential investors is expected to catalyze increased-private sector investment in IZs.
Higher rates of industrial land occupancy	Reducing incentives for unproductive, speculative uses of industrial land through the development of new legal frameworks, standards and practices along with demonstrating the viability of new models of zone development and management are expected to increase rates of zone occupancy.
Job creation	Market-driven zone development and management is expected to foster expansion of existing firms as well as the creation of new businesses, which in turn is expected to have a positive impact on jobs.

Findings - Rural Land Activity baseline evaluation

In this report we establish baseline values for key outcomes and demonstrate balance between our treatment and control groups through our matching process (project impacts will be estimated in the endline report). We also assess whether the activity (based on its program logic) is addressing the needs of the population at baseline, as part of our mixed-methods performance evaluation.

The Rural Land Activity was intended to be implemented between June 2017 and the original compact closeout in June 2022; however, the compact was extended to March 2023 owing to delays related to the COVID-19 pandemic (MCC 2021). The planned and actual timeline for the optimized *melkisation* procedure is depicted in **Figure ES.1.** A detailed analysis of program implementation will be incorporated into the endline report.

Figure ES.1 Implementation timeline for the Rural Land Activity



Balance between treatment and control, and baseline outcomes

With a few notable exceptions, the treatment and control groups are balanced at baseline prior to matching on observed characteristics and in most characteristics that may influence outcomes of interest, such as household income or existing holdings of productive assets. In Gharb, we find three variables that are unbalanced in the unmatched sample: total land holdings, area of the target parcel, and share of household owning a drip irrigation system. In Haouz, we find that treated households are less likely to be married, have fewer children, and wealthier along some dimensions. Following matching, however, the statistical balance across all variables is improved, and we can achieve a balanced sample with common support.[4]

Key findings related to baseline outcomes of the Rural Land activity are described in **Table ES.3**. Baseline findings validate most constraints highlighted in the program logic, confirming that the Rural Land Activity was designed to address the needs of the population. Two notable exceptions are related to credit access and land tenure security – the risks to the achievement of these outcomes are described below.

Table ES.3. Key baseline findings for the Rural Land Activity

Constraint confirmed?	Outcome	Findings
~	**Credit access**	Our baseline findings confirm that credit access at baseline is limited but highlight that an aversion to risk may be a stronger binding constraint. Farmers are not applying for loans of a size that they would consider large enough to make productivity-enhancing agricultural investments, most commonly due to risk aversion or a lack of demand for capital and less commonly due to credit constraints. However, just under half of farmers report that they would apply for credit were it not for constraints to access, such as lack of sufficient collateral or documentation (for example, a land title), or income.
✓	**Land market transactions**	Our baseline findings confirm that informal land transactions are common in Gharb and Haouz, both among rightsholders and with non-rightsholder buyers, suggesting that there is underlying demand for land in the project areas and confirming that *melkisation* may lead to a more dynamic (legal) land market.
~	**Land tenure security**	Our baseline findings show that tenure security is high, and rates of conflict are low for male collectivist landowners, who represent most owner-operators in our quantitative sample. However, specific sub-groups, including women, informal non-collectivist buyers, renters/sharecroppers, and in some cases, youth, report much higher tenure insecurity at baseline.
✓	**Agricultural investments**	Our baseline findings confirm that agricultural investments and modern agricultural practices are limited, most commonly due to a lack of credit and risk aversion. Gharb and Haouz differ in land use and cultivation practices, with Gharb being more input intensive and having higher ownership of productive assets compared to Haouz. Gharb has a higher value of agricultural production than Haouz, which could be a result of crop composition differences rather than yield differences, but it might also reflect greater climate vulnerability and drought experienced in Haouz.

[4] "Common support" is a technical term related to propensity score matching impact evaluation design. It refers to the comparability of treatment and comparison groups along key indicators; visually this is depicted as an overlap between the propensity score distributions in the treatment and comparison groups in a graph.

Constraint confirmed?	Outcome	Findings
✓	**Agricultural productivity**	Our baseline findings confirm that agricultural productivity is limited due to a lack of water and irrigation, vulnerability to weather, and drought. The farmers expressed a need for agricultural training, functional literacy, and credit-related information to help address these issues.
✓	**Household income**	Our baseline findings confirm that households in both regions (though more so in Gharb than in Haouz) derive a substantial share of income from agricultural production, validating that *melkisation* could lead to improved household income through increased investments in agricultural productivity.
(Other)	Rates of *de facto* parcel co- or joint-ownership were high at the time of data collection, and will be higher after *melkisation* (for reasons of having to regroup to meet the Ministry of Agriculture (MoA)'s requirement of a 5 ha minimum operating surface area). This could complicate decision-making related to productive investments, applications for credit, and land transactions.[5]	

Summary of program logic risks

As noted in **Table ES.3** baseline findings confirm that credit access is indeed a constraint for the population at baseline but highlight that risk aversion may be a stronger binding constraint for farmers. Although there is scope for *melkisation* to improve credit access by allowing land to be used as collateral, the impact may be muted for farmers who are risk averse or do not have a profitable project. Farmers anticipated that the provision of land titles, which allow for legal transactions of land, will lead to more transactions at higher prices. However, farmers also raised concerns about the risk to profitability associated with climate change and the complicated ownership structures that will persist due to the GoM MoA five-ha minimum operating parcel size requirement[6] (which pre-dated the optimized *melkisation* procedure).[7] Even though households are gaining titles, joint-ownership and the associated pressures exerted by extended families may undermine the impacts of the *melkisation* program, especially around making decisions to sell or rent out land, or use land as collateral.

Similarly, baseline findings highlight that land tenure insecurity is only a binding constraint for specific sub-groups. While a registered land title will provide program beneficiaries with a strong, documented, legal right to their land, impacts on subjective perceptions of tenure security will be limited by the strong de facto property rights regime already in place for most landowners (those who are men and members of the collective) and the low reported rates of conflict. Recent land reform around inheritance of collective land could have big impacts on tenure security for women, however the extent to which this will impact

[5] Joint ownership ("*indivision*") refers to a situation in which several people hold a use right to a property with undivided shares; whereas co-ownership refers to a situation in which the shares are divided. At baseline, all collective land is technically held in joint ownership with the entire collective, or "*grande indivision*"; however, parcels themselves may be operated and *de facto* owned either solely or jointly. In order to receive a *melk* title, parcels smaller than 5ha must be regrouped into "*lots*" with other parcels, and as such they will still be held in joint ownership with undivided shares ("*petite indivision*"), or in co-ownership with divided shares. Additional detail is provided in the findings section of the report. These definitions are also included in Table B.5 in Annex B.

[6] Through law 34-94, the Ministry of Agriculture defines a minimum operating surface area (or *superficie minimum d'exploitation* (SME)) for agricultural land parcels located inside irrigated perimeters. This law predated, but has important implications for, the optimized *melkisation* procedure as it requires rightsholders with less than 5 ha to regroup into "lots" of 5 ha with other farmers in order to receive a title.

[7] The project worked on this as a policy issue for debate under the Land Governance Activity, however it was not resolved within time to impact the results of the improved *melkisation* pilot.

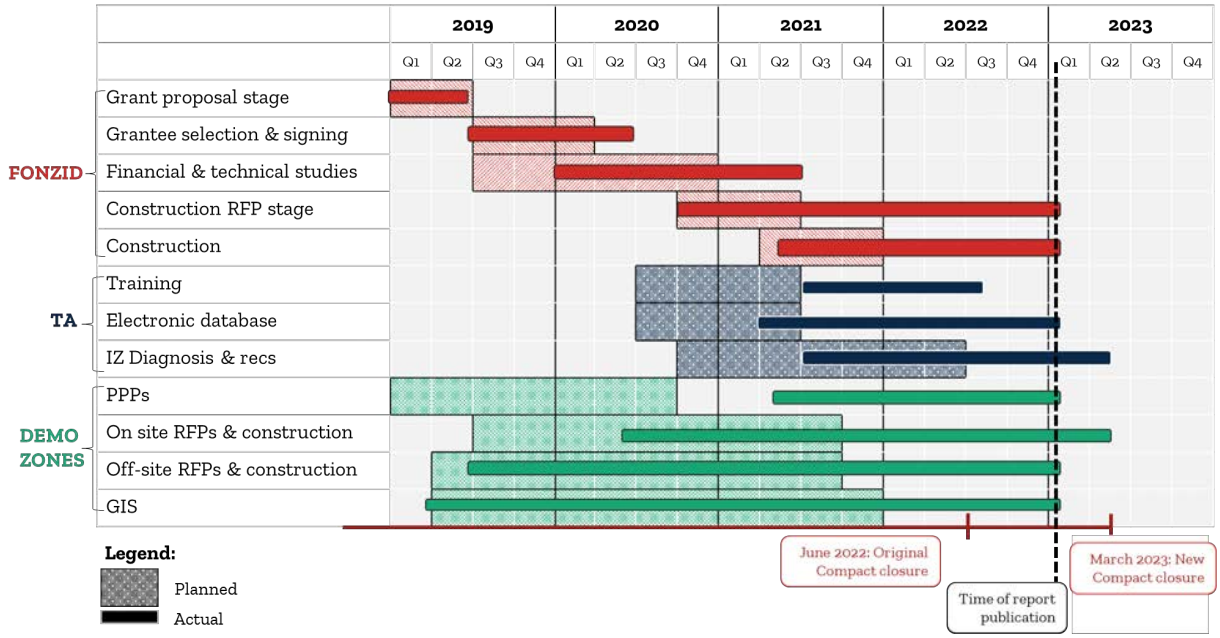
agricultural outcomes will depend on deeper shifts in cultural and gender norms related to women's involvement in agriculture. Farmers in both regions identified lack of water and irrigation, vulnerability to weather, and drought as significant constraints on agricultural productivity. These risks may undermine the achievement of impacts on agricultural productivity and incomes, even if intermediate outcomes are observed. Finally, although we may observe impacts on agricultural productivity following *melkisation* because of increased investment or efficiency-enhancing land transactions, it is not clear whether changes in agricultural productivity will be driven by a shift in crop composition towards higher-value crops, an increase in productivity for existing crops, or some combination.

Findings - Industrial Land Activity baseline evaluation

In this report, we focus on establishing a baseline that allows EQ2 to be addressed by assessing pre-intervention levels of and trends in outcomes of interest for the Industrial Land Activity.

The Industrial Land Activity was intended to be implemented between the beginning of 2019 and the original Compact closure in June 2022; however, the Compact was extended to March 2023 because of COVID-19-related delays (MCC 2021). The planned and actual timeline for the Activity is depicted in **Figure ES.2.** A detailed analysis of program implementation will be incorporated into the endline report.

Figure ES.2. Implementation timeline for the Industrial Land Activity



Baseline outcomes

Key findings related to baseline outcomes of the Industrial Land activity are described in **Table ES.4**. We report insights from key information interviews, triangulated with satellite-based measures of land utilization and economic activity, and administrative zone-level data on land-use patterns. Our findings confirm the existing role played by the State (GoM) in industrial land provision and the reality that industrial zone management practices are inconsistent and do not always meet the needs of users. Likewise, we confirm that industrial land-use is sub-optimal and that there is scope for increased utilization and valorization of industrial land.

Table ES.4. Key baseline findings for the Industrial Land Activity

Outcome	Findings
Efficient, transparent, and equitable process of IZ development/revitalization	Insights from key informant interviews confirm MCC's earlier assessments that that restrictive laws and onerous procedures associated with identifying, acquiring, and developing land inhibit industrial zone development in Morocco
Private-sector involvement in development of zones	Key informant interviews also confirm that the industrial land sector is dominated by a strong presence of the State in the conception and development of industrial zones.
IZ management, maintenance, and operation	Inconsistencies in the quality of management across industrial zones persist, and there is particularly high demand for improving the provision of zone-level infrastructure and services. Gaps in zone-level service provision appear to limit women's labor-force participation. Zone-level security concerns (stemming, for instance, from poor provision of lighting or transport options at night) disproportionately affect women employees.
Private investment of industrial firms	The main benefit for investors is location, including proximity to major urban areas. However, this has not always translated into stable access to a skilled workforce.
Industrial land occupancy	The share of industrial lots that have been leased/sold at baseline is high. However, many of these have either not been developed or are used for unproductive purposes (such as storage).
Job creation	Economic activity (as proxied by nighttime luminosity) in the demonstration zones appears to be trending positively, suggestive of higher growth and job creation. Subsequent rounds of geospatial data collection have the potential to further highlight increases in zone-level built-up area and economic activity associated with Compact-supported activities.

Summary of program logic risks

Baseline findings confirm that there is scope for private sector led development of industrial zones in Morocco to lead to greater investment, through improved industrial zone management and infrastructure provision. However, our analysis also identified important risks. First, most lots in the existing zones implicated in the activity appear to have been leased or sold prior to the project. However, in many cases lots are not being used in the most effective way (for example used only for storage) and will either need to be used differently by existing tenants or transferred to other users. The absence of a strong tenant base also risks undermining the creation of tenant/firm associations, which are crucial to guiding the design and management of the zones. Second, firms in zones reportedly struggle to hire workers with specialized industrial skills. Both skilled and semi-skilled workers (such as electrical engineers and trained welders, respectively) are in high demand. However, given the peri-urban/rural nature of the location of some industrial zones, firms typically must hire qualified workers from larger urban areas (such as Casablanca or Mohammedia), where wages for such workers are higher. Depending on the location and surrounding market conditions, industrial zones may continue to struggle even if there are improvements in management and infrastructure brought about by the compact.

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I. Introduction

On November 30, 2015, the Millennium Challenge Corporation (MCC) and the Government of Morocco (GoM) signed a $450 million compact agreement to support policy and institutional changes to improve Morocco's investment environment and create models for engagement with the private sector (MCC 2015). The compact, which entered into force on June 30, 2017, comprises two projects: (1) the Education and Training for Employability Project, and (2) the Land Productivity Project.

A. Overview of the Land Productivity Project

The Land Productivity Project is designed to address several key barriers in the land sector that limit the productivity of land for investment purposes through three activities: (1) the Land Governance Activity ($7.8 million), which will support the development of a National Land Strategy to undertake comprehensive legal, regulatory, institutional and procedural reform; (2) the Rural Land Activity ($30.3 million), which will deliver individual (or co-owned) land titles to smallholder farmers on formerly collective land; and (3) the Industrial Land Activity ($131.4 million), which will pilot a new market-driven public-private partnership (PPP) approach to industrial zone development.

The Rural Land Activity

Agriculture accounts for 36 percent of employment in Morocco overall (HCP 2017) and 52 percent of female employment (FAO 2015), but it makes up only 12 percent of gross domestic product (GDP) (World Bank 2019). Across all types of land, just 4.4 percent of land is owned by women in Morocco, representing just 2.5 percent of agricultural land, among the lowest rates globally (FAO 2015). Agriculture's low share of GDP reflects low productivity in the sector driven partly by low levels of investment on 15 million hectares (ha) of collective (*soulalyate*) rural land. These lands are administered by the state on behalf of 4,600 ethnic collectives and governed by customary practices (MCA-M 2018b). Under Moroccan law, all collective land is held in joint ownership with undivided shares, meaning that several collectivists[8] (members of the ethnic collective) hold a right of use to the collective land. (Joint ownership is known as "*indivision*" in French in this context; sometimes referred to as "*grande indivision*" due to the large number of collectivists with whom the land is jointly owned). While the collective land is informally divided into defined shares (i.e. land parcels which are *de facto* operated by one or more people), the legal property use right to the collective is undivided (i.e. those land parcels are *de jure* owned by the entire collective). As a result, collective land parcels cannot be legally sold or rented, and any action on the property must be approved by all the parties holding the right of use (Table B.5 in Annex B provides a complete glossary of key land terms). The restricted set of rights for collective land has dampened agricultural productivity by preventing land from being used as collateral to access credit. It has also restricted land market transactions that could enhance productivity by increasing the scale of farming operations or shifting land to more productive farmers. Furthermore, while there is no

[8] A collectivist is a member of the ethnic collective who has a (collective) right of use to the ethnic collective land which is jointly exploited according to customary practices and the regulations in force.

legal prohibition against women buying and owning private *melk* land (including obtaining it through inheritance), women in Morocco have historically faced barriers to accessing collective land.[9]

To increase investment and productivity in these lands, GoM issued in 1969 a law[10] that established the policy known as *melkisation* to convert rural collective land located in irrigation perimeters to private ownership (*melk* land Through this procedure, collectivist members could become owners of the land, under either individual, or co- or joint-ownership[11] (sometimes referred to as "*petite indivision*"), and could thereafter further divide the "mother" title into individually titled and registered parcels of 5 ha or greater (the minimum agricultural operating area currently in force).[12] However, as described in Harris et al. (2020), the original *melkisation* procedure has resulted in just 36,000 ha collective land being converted to private ownership, a result of the need for extensive coordination between ministries, unclear responsibilities, and lengthy processes taking 10 to 17 years to complete (MCA-M 2018b).

Program Logic

To address these challenges, the **Rural Land Activity ($30.3 million)** was designed to develop and pilot a more efficient and inclusive ("optimized") procedure for *melkisation* in the regions of Gharb and Haouz, in which land titles were to be issued to rightsholders or their heirs in three years or less. The Rural Land Activity program logic[13] (depicted in **Figure I.1** and described in detail in MCA-M and MCC 2022) hypothesizes that the optimized *melkisation* procedure will provide more secure, formal rights to land, which will provide the conditions necessary to incentivize farmer investment and modernization of agricultural activities, in turn increasing the agricultural productivity and income of farmers. Formal land titles are expected to enable land transactions and increase farmers' access to financing in the short-term, which will lead to a more efficient allocation of land resources and increased investments by households in the medium term. It is also expected that land-related conflicts will be reduced because of formal parcel registration and demarcation, thereby producing an unassailable land title. Accompanying measures (activities implemented in tandem with the optimized *melkisation* procedure, described below) are expected to maximize the benefits of a land title for farmers and their households and enable women and youth to benefit from the *melkisation* program, ultimately resulting in a more equitable land regime.

[9] Inheritance of collective lands has historically been limited to a single heir, typically a man, owing to a "single heir" provision in Moroccan inheritance law. Use rights have also historically been limited in keeping with customary practice (Adnane 2018).

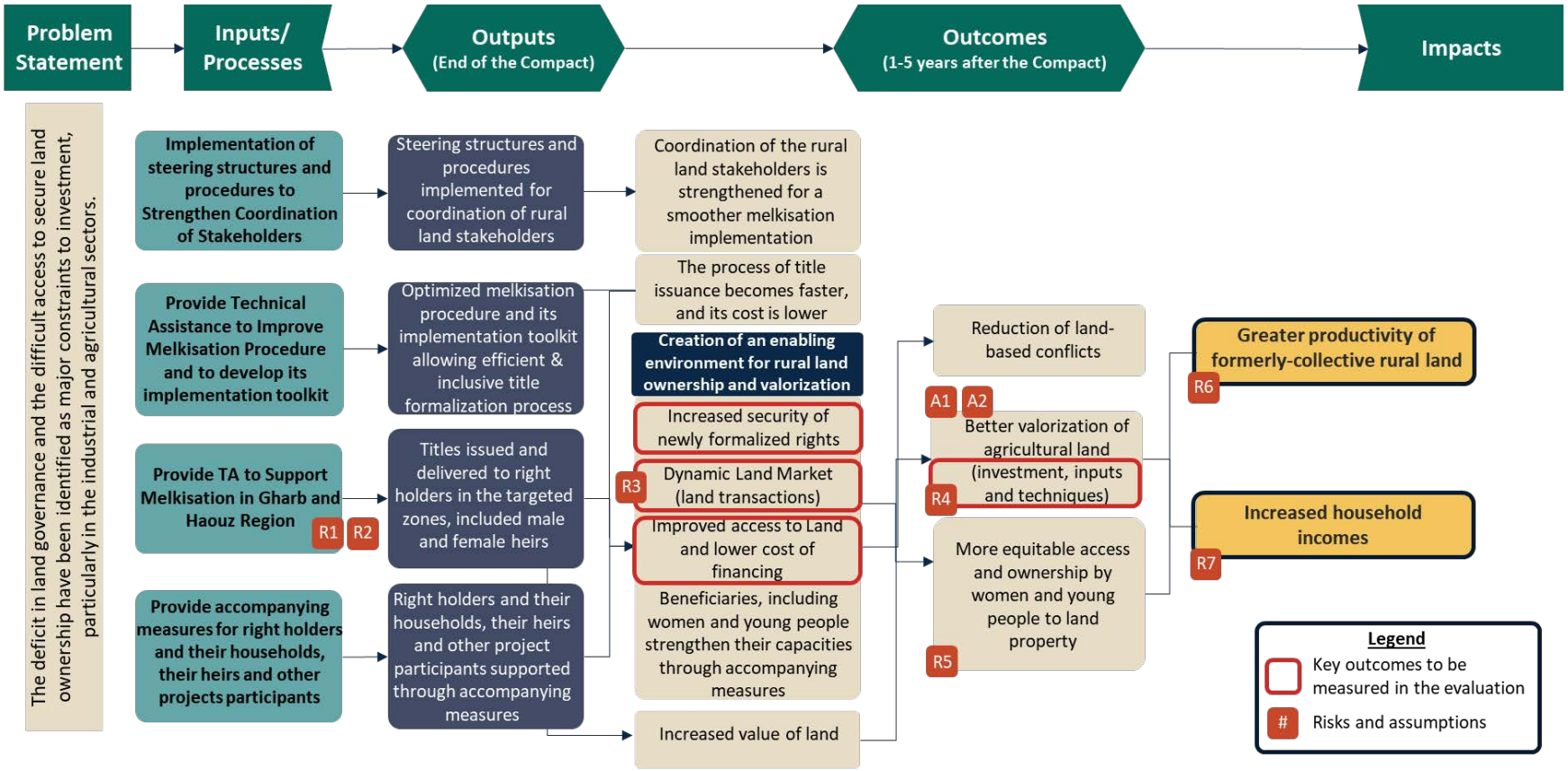
[10] In 2019, in connection with the MCC Morocco Compact, GoM passed several new laws governing collective lands (62.17, 63.17, and 64.17), which updated governance, transfer, and use rights. These new laws are described in further detail in Harris et al. 2020.

[11] Co-ownership (*copropriété* in French) represents a legal regime in which several people are holders of a plot but have rights to separate units of that plot and joint ownership (*indivision* in French) represents a regime in which the right to the plot is undivided and each user may have a right to the entire property. See Table B.5 in Annex B for more detail.

[12] Through law 34-94, the Ministry of Agriculture defines a minimum operating surface area (or *superficie minimum d'exploitation* (SME)) for agricultural land parcels located inside irrigated perimeters. This law predated, but has important implications for, the optimized *melkisation* procedure as it requires rightsholders with less than 5 ha to regroup into "lots" of 5 ha with other farmers in order to receive a title.

[13] The Morocco Compact II Monitoring and Evaluation Plan, which includes the research questions and logic models for the Land Productivity Project, was updated in December 2022 (after the publication of the evaluation design report). We have updated our measurement approach to align more closely with this new logic model.

Figure I.1. Rural Land Activity Program Logic, Risks and Assumptions



Risks and Assumptions:

A1: The possibility for right holders to benefit from subsidies granted by the government as part of Morocco's Green Generation 2020-2030 agriculture strategy as well as credits from the banking sector.
A2: The fluidity of land transfers will potentially lead to the emergence of farms of a more viable size.
R1: Moroccan Law does not allow land titles to be granted as part of Melkization to individuals who may have a claim to the parcel but who are not on the official list of Rights Holders (or the heirs of those Rights Holders), this includes the following broad two broad categories of "claimants": (1) Non-right holder buyers involved in a transaction prior to melkisation; and (2) Presumed members of the EC who are not included on the lists of right holders.
R2: There is a risk that the Melkization procedure will not be implemented within three years, although the process is certainly more efficient than in the past.
R3: A strong attachment of farmers to the land could keep market dynamics at a low level even after Melkization.
R4: Joint ownership and the requirement for parcels to be a minimum of 5 ha could in certain cases slow down the market dynamics and the valuation of land.
R5: Recent laws put in place offer increased opportunities to formalize women's access to land, however, without sufficient shifts in knowledge, attitudes and practices, women may have limited ability to maximize the benefits of their title.
R6: Insufficient use of sustainable and modern agricultural techniques combined with climatic hazards will limit the improvement of agricultural productivity.
R7: In the case of a more dynamic market, there is a risk of exclusion for small farmers who may lose their source of income after selling the land.

Source: Adapted from MCA-M and MCA-M (2022)

Program participants and beneficiaries

The Rural Land Activity identifies all farmers farming land targeted by the activity as program participants as well as participants in the accompanying measures (Monitoring and Evaluation (M&E) plan—MCC 2022). The activity identifies as beneficiaries "all farmers exploiting collective land targeted by the activity" and "all participants in the accompanying measures (Collectivists, non-rightsholder operators, trainers from NGOs, ONCA and ANLCA executives, etc.)" The program participants include people who will not receive a title as part of the *melkisation* program (this group would include those who rent land or bought land informally from collectivist farmers).

Design of the Rural Land Activity

This MCA-M "optimized" *melkisation* procedure was designed to be executed in two phases: a preparatory phase in which collective land to be privatized was identified and legally "cleared," and an implementation phase to be led by the NST group[14] with six steps: information campaigns, the development of rightsholders lists, household and parcel surveys, subdivision, a joint allocation decree, and finally the issuance of individual (or co-owned) land titles **(Figure I.2)**. In addition, three "accompanying measures" were designed to increase the impact of the optimized *melkisation* procedure and to mitigate risks to key social groups—particularly youth and women—identified during compact development and the first year of execution **(Table I.1)**. Another key aspect of the Activity design was to implement steering structures and procedures to strengthen stakeholder coordination.

[14] NST is an abbreviation for NOVEC/SAFTOP/TAOUHID: a consortium of three separate consulting agencies that were selected by MCA-M. NOVEC led the overall land registration process including awareness-raising campaigns and support to heirs, while SAFTOP and TAWHID led the mapping operations in Haouz and Gharb, respectively.

Figure I.2. Steps in the optimized *melkisation* procedure

	Description	Stakeholders
 **Step 1** **Identification and legal "clearing" of land base**	ANCFCC determines the stage of each collective land "mother title" in the cadastral registration process and in the (former) *melkisation* procedure. NOVEC (NST) maps the boundaries (via aerial imagery) of any non-registered collective land "mother titles". ANCFCC ensures that the collective land "mother title" has no opposition/conflicts in progress (that is, legal "clearing"). ANCFCC establishes a registered "mother" land title in the name of each ethnic collective and issues clearance to be *melkised*.	NST, ANCFCC, ORMVA, Provincial Commission, *Nouab*
Cross-cutting step: *Information campaigns and establishing the grievance mechanism*	*Occurs initially at project outset, and then throughout the melkisation procedure.* *NST informs population in presence of nouab of the project objectives, benefits, and potential risks and grievance procedures.* *The Provincial Commission is responsible for setting the deadline and methods; nouab and NST are responsible for executing.*	*Provincial Commission, NST, Nouab*
 **Step 2** **Establishment of rightsholders list**	*Nouab* convene rightsholders to establish a list of rightsholders for each ethnic collective and redress any grievances. List is approved by the *Caid*, Conseil de Tutelle, and finally DAR/MoI and published in the Official Bulletin. In many collectives, the lists of rightsholders had been previously established because the 1969 law authorizing melkisation called upon collectives to establish their rightsholder list within a set period. Moroccan law does not allow to amend where rightsholder lists are already published to the official bulletin, however the project grievance mechanism allows for individual complaints to be processed.	*Nouab*, *Caids*, *Conseil de tutelle*, DAR, Ministry of Interior
Informal step: *Inheritance acts*	*NST support heirs to collect documentation and establish inheritance acts, to facilitate the registration of their shares on land titles (in cases where the original rights holder is deceased).*	*NST*
 **Step 3** **Household and parcel survey**	NST conducts a parcel survey to identify the rightsholder(s) and any other persons with links to the parcel, and collects parcel information related to geography, land use, transactions (rentals, sales, exchanges) and conflicts. NST then conducts a survey with each household linked to the parcel, including sociodemographic information and information about income-generating activities, household expenditures, and loans. The outcome is a definitive "parcel plan" on which the subdivision process will be based; it also feeds into the Social Management Plan (which details risks to key stakeholder groups) and measures to address these risks. (NST Nov. 2021, NST June 2022)	NST, *Nouab*, parcel operators, rightsholders, de facto owners
 **Step 4** **Subdivision**	NST develops a preliminary subdivision plan at the collective level in which parcels (or groups of parcels called "*lots*") of ≥ 5ha are identified to be *melkised*, which are presented to community members with a period for public comment. Subdivision plan is validated by the *nouab* and submitted to ORMVA and the ANCFCC for approval. NST then executes the definitive subdivision plan by physically demarcating parcel boundaries using markers.	*Nouab*, rightsholders, ORMVA, ANCFCC

	Description	Stakeholders
Step 5 **Joint allocation decree**	Provincial Commission cross-checks and validates the list of rightsholders on the attribution decree to ensure alignment with the published lists. Ministries of Interior, Agriculture and the General Secretary all approve and publish in the Official Bulletin a decree that land titles will be jointly awarded to the collective rightsholders as described in the definitive subdivision plan.	Provincial Commission, ORMVA, MoI/DAR, General Secretary
Step 6 **Registration of individual land titles**	Submission of the *melkisation "dossier"* to ANCFCC for registration. Inscription of the list of rightsholders and of the subdivision plan on the "mother" (collective-level) land title. Registration by ANCFCC of individual (or co-owned) parcel land titles in the names of the rightsholders (and heirs of rightsholders) as set out in the joint allocation decree.	MAPMDREF/ORMVA, MoI/DAR

Sources: MCA-M (2019a), MCA-M (2022), MCA-M and MCC (2022)

Acronyms and definitions: ANCFCC = Agence Nationale de la Conservation Foncière du Cadastre et de la Cartographie (National Agency of Land Registry, Cadastre, and Cartography); *Caid* = an appointed Ministry of Interior official overseeing *caidats* (an administrative unit including several rural communes); *Cheik* = leader of the Mqadem; Commission Provinciale = includes representatives from DAR ; DAR = Direction des Affaires Rurales (Directorate of Rural Affairs), under the Ministry of Interior; MAPMDREF = Ministère de l'agriculture, de la pêche maritime, du développement rural et des eaux et forêts (Ministry of Agriculture, Maritime Fisheries, Rural Development and Waters and Forests); MCC = Millennium Challenge Corporation; MCA-M = Millennium Challenge Account – Morocco ; MoI = Ministère de l'intérieur (Ministry of the Interior) ; Mqadem = auxiliaries of the *Caid* overseeing one or more douars (local administrative unit) or districts, who acts as controller and informant to the *Cheikh* and *Caid*; naib (pl) /nouab (s) = elected official representing ethnic collectives; NST = Groupement NOVEC/SAFTOP/TAOUHID; ORMVA = Office Régional de Mise en Valeur Agricole (Regional Office for Agricultural Development).

Table I.1. Accompanying measures of the Rural Land Activity

Implementer	Activity/objective	Targeted stakeholders
Agence Nationale de Lutte Contre l'Analphabétisme (ANLCA)	Functional literacy program	Youth and women (rightsholders, heirs, and informal buyers)
	Complementary modules to build knowledge of legal aspects related to *melkisation*	Youth and women (rightsholders, heirs, informal buyers, renters, sharecroppers)
Office Nationale du Conseil Agricole (ONCA)	In-classroom (theoretical) training to build agricultural technical capacity of farmers	Youth (rightsholders, heirs, non-rightsholder collectivists, renters, sharecroppers)
	Practical field training	
	Support for agricultural entrepreneurs in Professional Agricultural Organizations (OPA) projects *(joint activity with ONCA and CAM)*	Youth and women (rightsholders, heirs, non-rightsholder collectivists, sharecroppers)
	Awareness-raising (village council) *(joint activity with ONCA and CAM)*	Youth (rightsholders and heirs)
Groupe Crédit Agricole du Maroc (CAM)	Training sessions on financial education	

Source: NST Aug. 2022, and MCA-M and MCC 2022

Geographic scope and timeline

The signed compact agreement (MCC 2015) specified that the MCA-M optimized *melkisation* procedure was to be implemented on a pilot basis with 46,000 ha wholly or partially in the irrigated perimeter of the region of Gharb.[15,16] Subsequently, the pilot was expanded to include several accompanying measures to the land titling exercise and a second region of the Haouz, for a total of 66,177 ha,[17,18] 51,267 ha in Gharb in the provinces of Kénitra, Sidi Kacem, and Sidi Slimane, representing 34,337 rightsholders across 57 ethnic collectives, and 14,910 ha in Haouz in the province of El Kalâa des Sraghna in Haouz, representing 13,872 rightsholders in 3 collectives (Groupement NST 2019). The collective land included in the Activity does not cover all collective land in these two regions.

The Rural Land Activity was intended to be implemented between June 2017 and the original compact close-out in June 2022. However, the compact was extended to March 2023 because of COVID-19 pandemic-related delays (MCC 2021). The planned and actual timeline for the optimized *melkisation* procedure is depicted in **Figure I.3.** A detailed analysis of program implementation will be incorporated into the endline report.

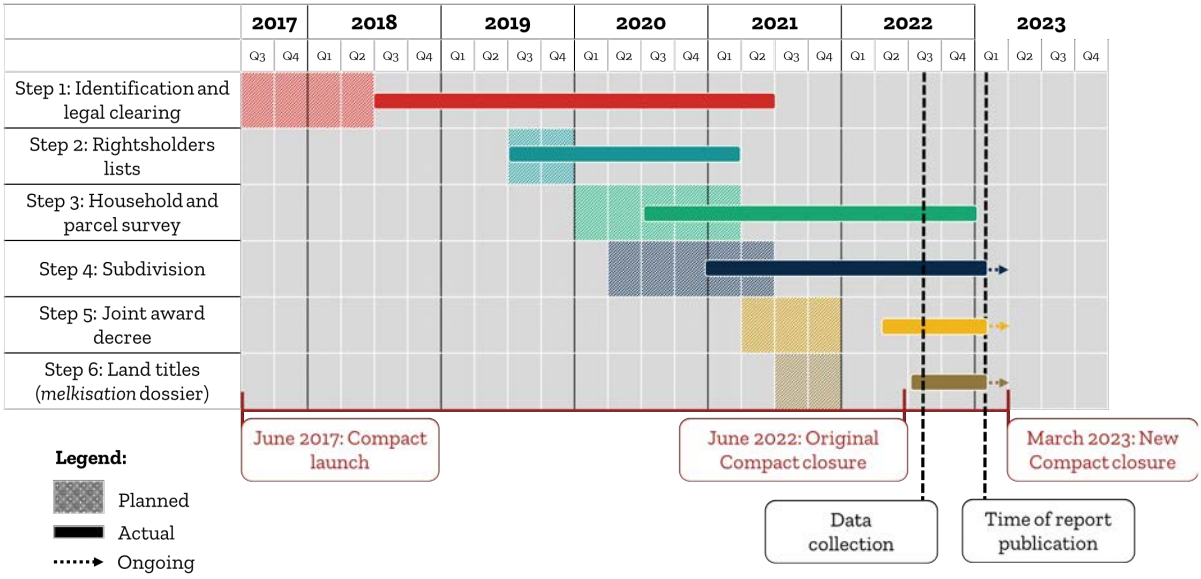
[15]The regions of Gharb and Haouz, and the irrigated perimeters we reference, are specially managed agricultural development zones under the Ministry of Agriculture. These zones include agricultural land served by major irrigation perimeters as well as agricultural land adjoining the perimeter. However, it is important to note that inclusion in the irrigated perimeter does not necessarily mean that parcels have access to surface water irrigation.

[16] There is an implicit expectation for the optimized *melkisation* procedure to be replicated by GoM. While our evaluation only covers the pilot, at endline we will assess whether GoM has scaled the procedure.

[17] The total surface area of ethnic collectives under the Activity is 61,177 ha, however this includes 177ha of *habous* and forest land which are not eligible for *melkisation*.

[18] The collective land included in the activity does not cover all collective land in these two regions.

Figure I.3. Implementation timeline for the Rural Land Activity



Link to ERR and Beneficiary Analysis

The results of the evaluation will be used to update the economic analysis of the Rural Land Activity. Prior to the launch of the activity, MCC conducted an economic analysis[19] to assess the viability of the project and the impact of the project on beneficiaries. Subsequently, MCC produced updated, revised CBA models in place of the ERR, which are presented in the project's updated M&E Plan (MCA-M 2022). The model assumes that by converting collective land to private ownership, farmers will increase investment and intensify agricultural production, leading to more productive agriculture and higher revenues. The economic analysis compares the difference in agricultural productivity levels between these two land regimes and the associated profits. Agricultural productivity for each group is calculated using an input/output method, in which the cost of inputs (for example, seed, fertilizer, mechanization) are netted out from the output revenue generated from the production of crops.

This evaluation will be used to estimate key parameters for the economic analysis.[20] The impact estimates from the evaluation will inform subsequent economic analyses, particularly in estimating changes in farming income and agricultural productivity on newly privatized land, and changes in household income. The evaluation will also contribute to understanding the types of investments, the role of credit and land transactions in contributing to investment, and the timing of investment. Finally, this evaluation will be used to update the incremental benefits generated from greater investment in collective land.

The Industrial Land Activity

Prior to the compact, industrial output accounted for only about 15 percent of Morocco's GDP—a level that remained relatively constant since the early 1980s (World Bank 2018). This situation was driven in part by a lack of land that meets firms' needs. Despite high vacancy rates in industrial zones, more than

[19] For more detail, see the EDR (Harris et al. 2020) and Project M&E plan (MCA-M 2022).

[20] Although we expect the outputs of the evaluation to be used in future economic analyses, MCC M&E has shifted away from having the independent evaluator conduct an economic analysis or re-calculate the Economic Rate of Return as part of the evaluation.

40 percent of firms claimed that land access was a major or severe obstacle, indicating (1) a mismatch in the characteristics of available land and demand, and (2) land speculation (World Bank 2009). Binding constraints that restricted the purchase or rental of land suited for industrial production included prohibitive land prices; limited credit accessibility; less-than-ideal locations and characteristics of available land; poor zone infrastructure, management, and maintenance; and prohibitive land regulations (World Bank 2007).

To address these challenges, the **Industrial Land Activity ($131.4 million)** aimed to introduce systemic changes to transform how the Government of Morocco develops and manages industrial land, from a state- to a market-driven approach. The activity will achieve this through supporting institutional change and piloting new approaches to the development and management of industrial zones. The activity comprises the following sub-activities: [21]

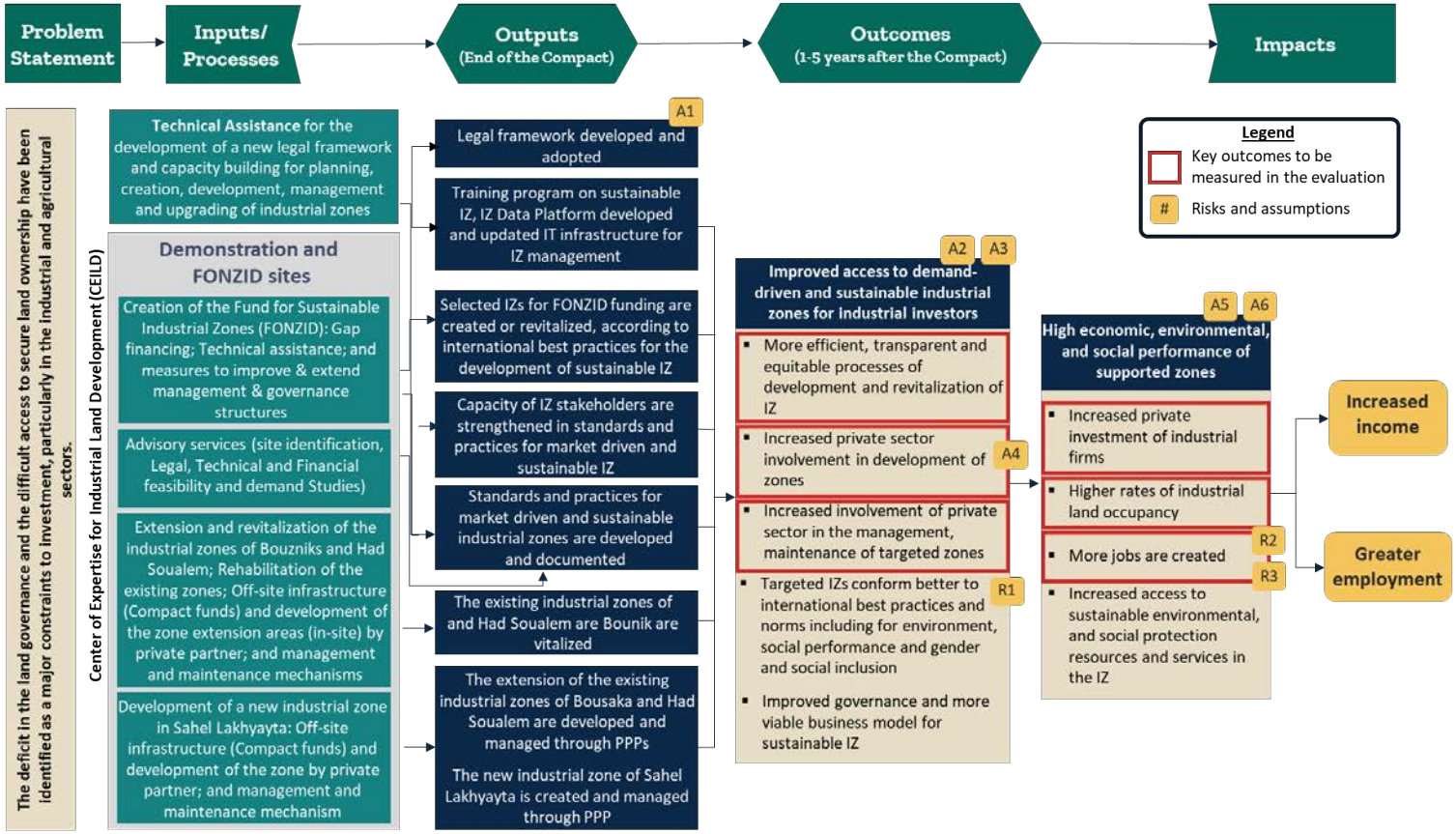
- **Technical Assistance (TA)** through the creation of a Center of Expertise for Industrial Land Development (CEILD), which is leading the development and institutionalization of the new market-driven approach by (1) acting as a center for technical expertise and knowledge management, and (2) promoting a new law for industrial zone (IZ) management.
- **Industrial Zone Public-Private Partnership (PPP) Demonstration Project** is developing three demonstration sites in the Casablanca region. Specifically, MCA-M will provide technical assistance and capacity building to MIC (Ministère de l'Industrie et du Commerce) to upgrade and expand two brownfield zones (Had Soualem and Bouznika) and newly create a greenfield site (Sahel Lakhyayta).
- **The Fund for Sustainable Industrial Zones (FONZID),** set up in conjunction with MIC, supports projects that improve the governance and sustainability of existing or new industrial zones. Specifically, financing provided by the fund focuses on reinforcing capacity to improve management and governance of industrial zones; improving services for businesses and employees; and improving social and environmental performance, gender inclusion, health/security, and basic infrastructure.

Program Logic

The Industrial Land Activity's program logic model (**Figure I.4**) stipulates that greater private-sector involvement in the development and management of industrial land will result in more efficient markets that are better able to meet private-sector demand and the needs of enterprises in terms of location, supply of land, infrastructure, and services (MCA-M 2022). Specifically, reorienting the way the Government of Morocco brings industrial land to market—from a state- to a market-driven PPP approach—is expected to increase private investment, incomes, employment, and returns on investment in IZs. This should happen through a combination of technical assistance and advisory services for the development of new legal frameworks for zone development and management; leveraged financing to improve zone management and governance structures; and support for zone development, extension, and revitalization in demonstration sites.

[21] A fourth sub-activity – the Morocco Green Guarantee – was added to the Industrial Land Activity in March 2023 by deploying $10 million in unused compact implementation funds available due to currency exchange rate fluctuations. MCC did not amend the program logic or M&E plan to incorporate the sub-activity, and as such we do not include it in our evaluation. This sub-activity provides a grant to Tamwilcom to create additional capacity within Morocco's state-owned guarantee entity to guarantee commercial loans for projects that reduce carbon emissions or otherwise improve the environmental performance within Morocco's industrial zones.

Figure I.4. Industrial Land Activity Program Logic, Risks and Assumptions



Risks and Assumptions:
R1: Despite the commitments of the municipalities to performance relevant maintenance duties of existing areas of Had Soualem and Bouznika, there is the risk that these municipalities will not provide it according to international norms and standards.
R2: The economic situation may hinder the valuation of the lots available for all the areas targeted by the project.
R3: For the existing industrial zones of Had Soualem and Bouznika, several lots will not be valued immediately for legal and financial considerations. Indeed, some lots have land titles encumbered with heavy mortgages and conflicts between residents.
A1: Institutional and governance changes will support the implementation of new models for the exploitation and management of industrial zones and that address the problem of undervaluation of land by reducing incentives for speculation.
A2: The existence of unmet demand for industrial land.
A3: Satisfying this demand is hampered by the mismatch between the characteristics of the existing zones and the demand from manufacturers (location, size and price of lots, infrastructure, mode of governance, etc.).
A4: A better match between supply and demand in industrial zones is conditioned by a stronger involvement of the private sector in the development and management of industrial zones.
A5: Replication of the PPP model to ensure the attractiveness and profitability of these projects for the private sector.
A6: There is a significant difference in the quality and relevance of industrial zones supported by Compact II compared to conventional industrial zones. In addition, this difference is clearly internalized by companies so that the zones financed by Compact II funds are more attractive and will therefore experience a higher rate of valuation, investment and job creation.

Source: MCA-M and MCC (2022)

Program participants and beneficiaries

The Industrial Land Activity identifies program participants as 1) all employees of new companies created in newly valorized parcels, 2) all employees involved in rehabilitation and construction work, and 3) participants in training courses organized by CEILD (MCA-M and MCC 2022). In addition, MCC identified all potential employees of companies located in targeted industrial zones, as well as all members of their families as program beneficiaries.

Design of the Industrial Land Activity

The three sub-activities of the Industrial Land Activity are supported and overseen by CEILD. The components of each are summarized below and in **Table I.2.**

The aim of the **Technical Assistance sub-activity** is to build capacity for the development and institutionalization of a market-driven approach for industrial zones (IZs) through CEILD. This sub-activity includes training Ministry of Industry (MIC) staff and other stakeholders in the industrial land sector. In addition to the trainings, the center is mandated to develop educational tools and knowledge products, manuals, guides, technical reference documents, etc., for knowledge management and dissemination to various stakeholders. CEILD will also improve and update the MIC database of industrial land to support management of industrial land and to ensure that information on industrial real estate is accurate and accessible online. Finally, the TA sub-activity will produce a performance diagnosis and recommendations of industrial zones in Morocco.

The **Industrial Demonstration Zones sub-activity** is made up of two components, the first of which is the **PPP Demonstration zones**. As part of the PPP Demonstration zones component, MCA-M is designing and piloting a new model for the development of sustainable industrial parks and the revitalization of existing industrial zones driven by market demand in three IZs in the Casablanca-Settat Region[22]. This component will use PPPs as mechanism to leverage private sector involvement and will demonstrate environmental and social sustainability in the industrial land sector. Under this project component, MCA-M will use a PPP mechanism to revitalize and expand two of the zones, and the third zone will be built anew. The PPPs are designed so that the public partner provides the technical and financial feasibility studies, land mobilization, securing of authorizations, and connecting the site to utility networks, and the private partner provides the on-site investments and the commercialization, management, and maintenance of the zones.

The **FONZID**, the second Industrial Demonstration Zones sub-activity component, is providing TA and financing to the Government of Morocco for a grant facility that provides financing to promote innovative and sustainable governance models for existing or new IZs, in line with the new market-driven approach. The focus of FONZID financing is on supporting capacity to improve management and governance of IZs; improving services for businesses and employees; and improving social and environmental performance, gender inclusion, health and security, and basic infrastructure. FONZID projects include construction of rooms for business activities, offering services to businesses such as training, hiring, and business associations, and providing services for employees, including cafeterias, day cares, security, transportation, and trainings (**Table I.3** summarizes all 9 final projects funded by this sub-activity).

[22] The zone selection process entailed the government identifying 14 zones initially, and 6 of those zones were prioritized for revitalization based on their physical state.

In addition to the aforementioned components, the MIC, as part of the TA sub-activity, developed a law (Number 102.21) to provide legal framework for industrial zones. The law defines regulations for the development, management, and maintenance of IZs with the goal of promoting sustainable industrial development, land equity, and social, economic and environmental impact of IZs.

Table I.2. Industrial land sub-activity descriptions

Components	Description
Sub-Activity 1: TA	
 **Component 1** Industrial capacity building	1) 11 training modules for MIC and MCA-M staff 2) 10 training modules for key stakeholders related to industrial land comprised (and 2 optional modules) 3) Educational tools and knowledge products (such as manuals, guides, technical reference documents 4) Informational visits and conferences on industrial land 5) Other TA, such a technical assistance to IZ construction
 **Component 2** Creating an electronic database of IZs	1) Diagnosis of the existing databases 2) Designing the new platform 3) Developing testing and finalizing the new platform 4) Capacity building related to the database 5) Platform maintenance
 **Component 3** IZ performance diagnosis and recommendations	1) Designing the diagnosis methodology 2) Carrying out the diagnosis of 114 IZs 3) Producing recommendations for IZs.
Sub-Activity 2: PPP Demonstration Zones	
 **Site 1** Revitalizing and expanding Bouznika IZ	• Revitalize existing zone in Bouznika by upgrading existing infrastructure and incentivizing the use of unused plots, as well as expand the zone • IZ is located between Casablanca and Rabat, with an existing 31 ha operational zone and a proposed extension area of 28 ha
 **Site 2** Revitalizing and expanding Had Soualem IZ	• Revitalize existing zone in Had Soualem by upgrading existing infrastructure and incentivizing the use of unused plots, as well as expand the zone • IZ is located southwest of Casablanca with an existing operational zone of 68.5 ha with an extension area of 51 ha
 **Site 3** Building new IZ in Sahel Lakhyayta	• Developing a new IZ in Sahel Lakhyayta, also southwest of Casablanca.
Sub-Activity 3: FONZID	
 FONZID grants	• Provide 82 million USD ((37 through the FONZID Grants Facility and 45 from project sponsors) in financial and technical support for improving productivity, performance, and sustainable IZs

Table I.3. Description of FONZID projects by IZ

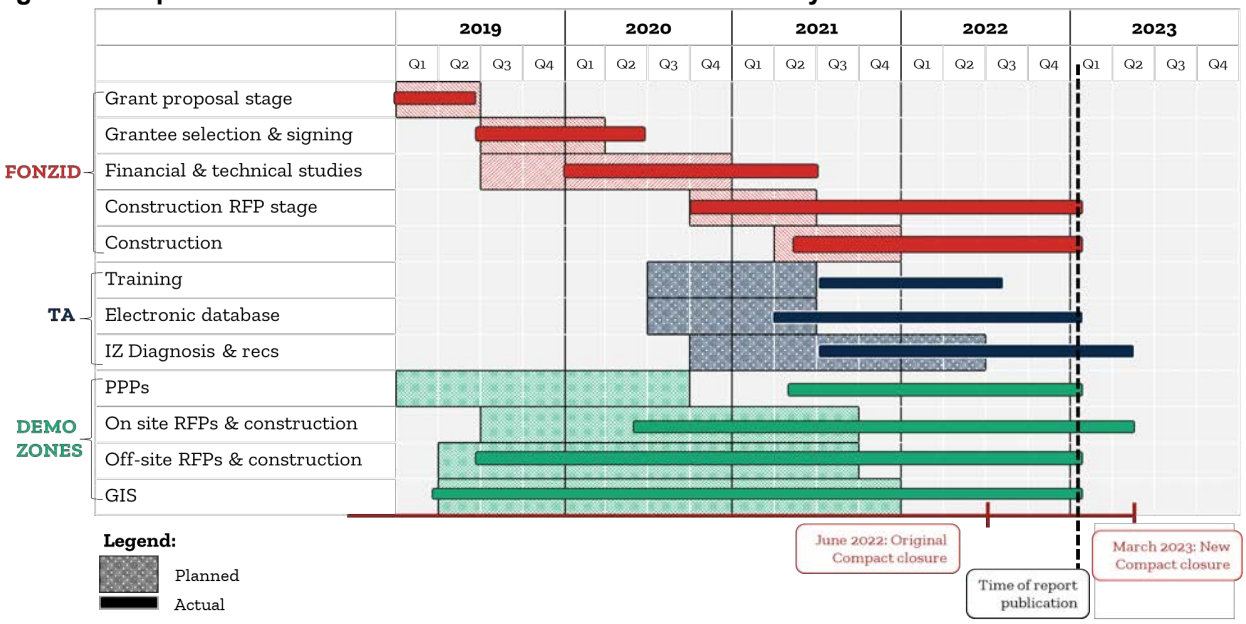
Type	Location	Description
New	Bouskoura	**Tawfiq Jadida Industrial Park** Construction and equipment of industrial buildings with sidewalks, including a subsidized cafeteria, management rooms, and training center.
New	Casablanca	**Sidi Bernoussi Multiservice Center** Construction and equipment of a multiservice building on the Sidi Bernoussi IZ site, with the aim of providing businesses on the site with rooms for meetings and trainings, a one-stop shop, an office for the association, and services for employees such as a health center, a cafeteria, a training center for women, and a child care center.
New	Casablanca	**Ahl Loughlam Industrial Park** Rehabilitation of existing infrastructure, construction of industrial building and a new service building, putting in a packaging reuse unit, and business (meeting room, show-room) and employee services (health center, pharmacy, cafeteria, bank agency, and day care center).
New	Casablanca	**Tatmine-DECZID Recycling Center** Extension of existing recycling infrastructure, installation of new infrastructure for recycling and transforming recycled plastic materials and a storage area for raw materials, and support sustainable governance of the center.
New	Fès	**Fez Smart Factory Project** Construction of a building, and creation of a social services center with cafeteria, day care, medical care services, and a one stop shop, as well as a business center, a start-up accelerator, an incubator, labs, engineering services, and creation of management structure and a business association.
Requalification	Agadir	**Requalification of Tassila Industrial Park** Rehabilitating existing infrastructure, developing new services for businesses with a focus on small and medium enterprises, including a training center, and services for employees and neighboring community members such as a day care, pre-school, cafeteria, and transportation. Installation of a management system for the zone.
Requalification	Tétouan	**Requalification of Tétouan IZ** Rehabilitation of existing infrastructure, recalibrating rain drainage canals, installation of social services equipment (a multiservice center, a training center, and a day care center)
Extension	Tétouan	**Extension of Tétouan Industrial Park** Road networks, sanitation, 3 buildings for youth and women entrepreneurs and people with disabilities, installation of surveillance cameras and green spaces, common spaces, and services for business and their employees (business association, one stop shop, cafeteria, security services, transportation, health and well-being center, mentoring)
Extension	Tiflet	**Extension of Aïn Johra Industrial Park** Extension of 28 hectares, construction of an industrial building, and a used water station, creation of an association, census of training needs for businesses, hiring services and business rooms for businesses, and an ISO 140001 and ISO 9001 certification. Services for employees including trainings, cafeteria, day care, and medical services.

Geographic scope and timeline

The industrial land activity was intended to be implemented between the beginning of 2019 and the original Compact closure in June 2022; however, the Compact was extended to March 2023 as a result of COVID-19-related delays (MCC 2021). The planned and actual timeline for the optimized *melkisation* procedure is depicted in **Figure I.5.** A detailed implementation analysis will be included in the endline report.

As noted above, the PPP approach to industrial zone development was piloted in three demonstration zones: two IZs to be revitalized and/or extended (Bouznika and Had Soualem) and one new IZ to be created (Sahel Lakhyayta). Bouznika IZ is located between Casablanca and Rabat, with an existing 31 ha operational zone and a proposed extension area of 28 ha. Site development will consist of (1) rehabilitating the existing IZ to upgrade infrastructure and incentivize the use of unused plots, and (2) expansion of the IZ. Had Soualem and Sahel Lakhyayta are both southwest of Casablanca and 10 km from the coast. Had Soualem IZ has an existing operational zone of 68.5 ha with an extension area of 51 ha. The site development will include both rehabilitation and expansion. Sahel Lakhyayta IZ is currently on 250 ha of greenfield development, of which 50 ha will be developed through the Compact.

Figure I.5. Implementation timeline for the Industrial Land Activity



Source: MCC

Note: PPP= Public-Private Partnerships, GIS= geographic information system

Link to ERR and Beneficiary Analysis

The results of the evaluation will be used to update the economic analysis of the Industrial Land Activity. Prior to the launch of the Activity, MCC conducted an economic analysis[23] to assess the viability of the project and the impact of the project on beneficiaries (MCA-M and MCC 2022). The economic analysis used two models to assess the ERR, one for FONZID projects that created new industrial zones and a different model for revitalizing existing zones. For projects that create new existing zones, the model calculates profit flows based on an increase in added value corresponding to the product of the area of the

[23] For more detail see the EDR (Harris et al 2020) and Project M&E plan (MCA-M 2022).

zone multiplied by the added value generated by the enhancements of the created area. Similarly, for projects that revitalize existing industrial zones, the model calculates profits corresponding to the product of area not yet developing multiplied by productivity rate that corresponds to average rent per land area unit with a low valorization rate. The ERR assumes that the benefits of the intervention carried out at the level of existing industrial zones are only generated through the rents generated by the occupation of non-valued lots. No increase in the rent per m2 or the level of income of company employees is expected. This performance evaluation will be used to inform key parameters for the economic analysis.[24]

B. Overview of the Land Productivity Project evaluation and baseline data collection

Mathematica is conducting a mixed-methods evaluation to understand how the Land Productivity Project was implemented, whether and why the expected results were achieved, how benefits accrued across groups, whether the outcomes are sustainable, and lessons learned. The evaluation of the activities uses both quantitative and qualitative methods to assess impacts and implementation. The evaluation consists of a baseline evaluation of the Rural Land Activity and Industrial Land Activity, which is the subject of this report, and an endline evaluation tentatively planned for 2026, which will also include an implementation analysis of both Activities. The endline report will also include an assessment of the Land Governance Activity. The original design envisioned conducting (1) a baseline in 2020, (2) an interim evaluation shortly after compact close in 2022, and (3) the endline evaluation five years later in 2027. However, because baseline data collection occurred in August 2022, six months before compact close, there is unlikely to be any measurable change in outcomes immediately after the close, and so we have agreed with MCC to drop the interim evaluation.

The Evaluation Design Report (EDR) (Harris et al. 2020) was originally structured around answering 22 evaluation questions that were specific to the three activities included in the Land Productivity Project. However, MCC M&E has recently revised their approach to evaluations, with the aim of focusing on two[25] key questions across evaluations:

> **EQ1.** To what extent was the project implemented according to plan (in terms of quantity and quality of outputs)?
>
> **EQ2.** Did the project achieve its stated objective in the time frame and magnitude expected, as documented in the M&E Plan? Why or why not?

The evaluation of the Land Productivity Project will include an implementation analysis (to be published as part of the endline report) for both the Rural and Industrial Land Activities, to understand whether the activities were implemented as planned and to assess facilitators of and obstacles to implementation. The implementation analysis will include an analysis of key documents and quantitative administrative data, as well as qualitative data analysis of key informant interviews (KIIs) and focus group discussions (FGDs). For the Rural Land Activity, Mathematica is conducting an impact evaluation using a matched

[24] While we expect the outputs of the evaluation to be used in future economic analyses, MCC M&E has shifted away from having the independent evaluator conduct an economic analysis or re-calculate the Economic Rate of Return as part of the evaluation.

[25] The evaluation will continue to address the original questions to the extent that they map to the revised questions and reflect key elements of the activities' program logic, objectives, or implementation. **Annex A** provides the full list of original research questions and a mapping to the new ones.

comparison group design[26] as well as a mixed-method performance evaluation. For the Industrial Land Activity, Mathematica is conducting a mixed-methods performance evaluation. Both evaluations will rely on quantitative and qualitative data sources as a key input, though there have been some revisions to the data sources originally identified in the EDR (details are provided below).

C. Overview of the Rural Land Activity evaluation

To address the evaluation questions, the Rural Land Activity evaluation employs a quantitative impact evaluation and a mixed-methods performance evaluation. The original proposed approach for the impact evaluation is a spatial regression discontinuity design (SRD) complemented by matching to generate impact estimates of *melkisation* for farmers who own collective land. The impact analysis is complemented by a qualitative performance analysis focused on understanding the mechanisms behind any impacts we observe and elaborating on the experience of groups that are not well represented by the quantitative analysis, including women, renters or tenant farmers, and informal buyers of collective land. The evaluation also includes an implementation analysis, to understand the extent to which the Activity has been implemented according to plan and achieved its stated objectives.

The evaluation relies on both quantitative and qualitative data sources. The quantitative data include survey data collected from 3,200 owners of collective land (and their spouses) in Gharb and Haouz, of whom half will receive titles as part of the *melkisation* procedure and half will not. They also include qualitative data comprising KIIs, as well as FGD with farmers, women's groups, and renter/tenant farmers, and project data and programmatic documents collected through the course of the compact. The final endline evaluation will incorporate data from crop-cut surveys, remote-sensing data, and administrative data from the ANCFCC, if they are made available.

Evaluation questions (EQs)

The evaluation of the Rural Land Activity answers the two evaluation questions using mixed methods and multiple data sources (**Table I.4**.). We employ implementation analysis to answer EQ1; and both a quantitative impact evaluation and mixed methods performance evaluation to answer EQ2. In this report, we establish baseline values for key outcomes for the impact evaluation (project effects on these outcomes will be assessed in the endline report) and assess whether the activity (based on its program logic) is addressing the needs of the population at baseline, as part of our mixed-methods performance evaluation.

Table I.4. Rural Land Activity evaluation questions, methods, and data sources

Evaluation question	Methods	Primary data sources	Secondary data sources
EQ1: To what extent was the project implemented according to plan (in terms of quantity and quality of outputs)?	Implementation analysis	• KIIs • FGDs	• Project documentation
EQ2: Did the project achieve its stated objective in the time frame and magnitude expected, as documented in the M&E Plan? Why or why not?	Impact evaluation Mixed-methods performance evaluation: qualitative and descriptive analyses of outcomes	• Farmer survey • Crop cuts • KIIs • FGDs	• Remote sensing data

KIIs = Key-informant interviews; FGDs = Focus-group discussions.

[26] The original design proposed using a spatial regression discontinuity with matching. We discuss the reasons for this change in detail below and in **Annex B**.

Data sources and outcome definitions

Table I.5 presents the primary outcomes for both the performance and impact evaluations, as well as the anticipated exposure period, sample unit, and corresponding data source (as proposed in the EDR). The quantitative and qualitative sampling approach and data collection instruments are described in detail in **Annex B.** A glossary of key terms and stakeholder definitions for the qualitative data collection are also provided in this annex.

Table I.5. Primary outcomes for the performance and impact evaluations

Outcome domain	Outcome measures	Exposure period	Sample unit	Data source
Access to credit	Applied for loan(s) Number of loans approved Size of loan(s) Terms of loan(s) (cost of borrowing) Purpose of loan(s) Collateral used for loan(s), including land	One to five years after receiving land title	Household	Farmer survey FGDs KIIs
Agricultural investments and practices	Durable investment, for example, in machinery or irrigation equipment Long-term, immovable investment, for example, tree crops Short-term investment in fertilizer, organic farming methods Crop choice	One to five years after receiving land title	Parcel and household	Farmer survey FGDs KIIs
Agricultural productivity	Yield (output per ha) Income (income per ha) Crop cover	One to five years after receiving land title	Parcel	Farmer survey Crop cutting Remote sensing
Land markets	Land purchased/sold (# of transactions; ha) Land rented in/out (# of transactions, ha) Price per ha (sale) Price per ha (lease) Operational size of farm (ha)	One to five years after receiving land title	Parcel and household	Farmer survey FGDs KIIs
Tenure security and legal knowledge	Subjective perceptions of tenure security Ownership structure, decision making among joint owners Number of land owners on title Legal knowledge Land conflicts and redressal	One year after receiving title (for tenure perceptions and legal knowledge); One to five years after receiving land title for other outcomes	Household	Farmer survey KIIs FGDs

FGD = focus group discussion; KII = key informant interview.

Impact evaluation

Identification strategy and description of counterfactual

Mathematica initially proposed to conduct a spatial regression discontinuity design (SRD) to identify the impact of the optimized *melkisation* program on parcel or household outcomes (see Harris et al. 2020 for a detailed discussion of the approach). This approach relies on comparing parcels in collectives that are

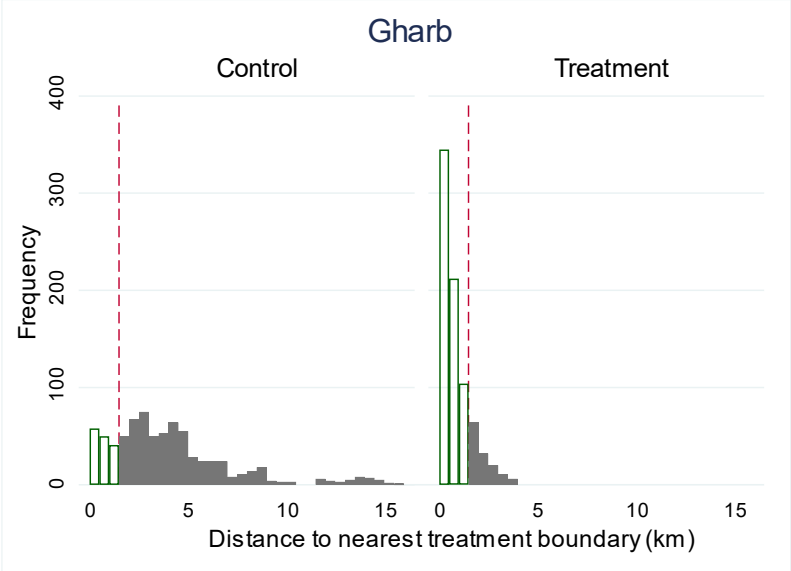
on either side of a boundary that determines access to the *melkisation* program, exploiting the fact that parcels on either side of the boundary might share similar, unobservable characteristics by virtue of their proximity. The group of farmers or parcels in a collective just outside the treatment boundary represents a counterfactual scenario for what would have happened had farmers who owned parcels inside the treatment boundary not received titles. A comparison of outcomes between the treatment and control groups after the intervention will then provide a causal impact of the program. Implementing a regression discontinuity design relies on being able to identify farmers or parcels in collectives relative to the boundary that determines treatment. We therefore required data from a sample of collective parcels on either side of the treatment areas. This first required that there be collective land near the treated collectives, and the second, that the parcels can be shown to be similar in pre-treatment periods on either side of the boundary.

Adjustments to proposed evaluation design following baseline

Since developing the design, several relevant features of the evaluation were changed that affect the suitability of the proposed spatial RD approach. First, during the development of the survey instrument we shifted away from collecting agricultural data at the parcel level to reduce respondent burden and fit the survey within the required duration. The original design proposed estimating impacts on outcomes such as yields, productivity and input use at the parcel level, using the spatial RD to control for unobservable parcel characteristics that also affect outcomes of interest. However, these key outcomes are now collected at the farm or household level. Second, due to a limited number of control collectives located near to treated parcels and the loss of several treated collectives from the sample, a larger part of the sample falls outside of the 1.5 km bandwidth identified in the initial design. **Figures I.6 and I.7** show the distribution of parcels by distance to the boundary. Restricting our analysis to only those parcels within 1.5 km prevents the evaluation from using information from the full treatment data set to estimate impacts.[27]

[27] Regression discontinuity designs usually require limiting the sample in this way and estimating the local average treatment effect for units that are close to the cutoff that determines treatment. Although it would be possible to choose a larger bandwidth to incorporate more of the sample into the analysis, this is eventually equivalent to comparing the full treatment and control sample. Expanding the bandwidth or conducting an analysis with the full sample would provide impact estimates for the full project area, though at the expense of the greater internal validity from an RD.

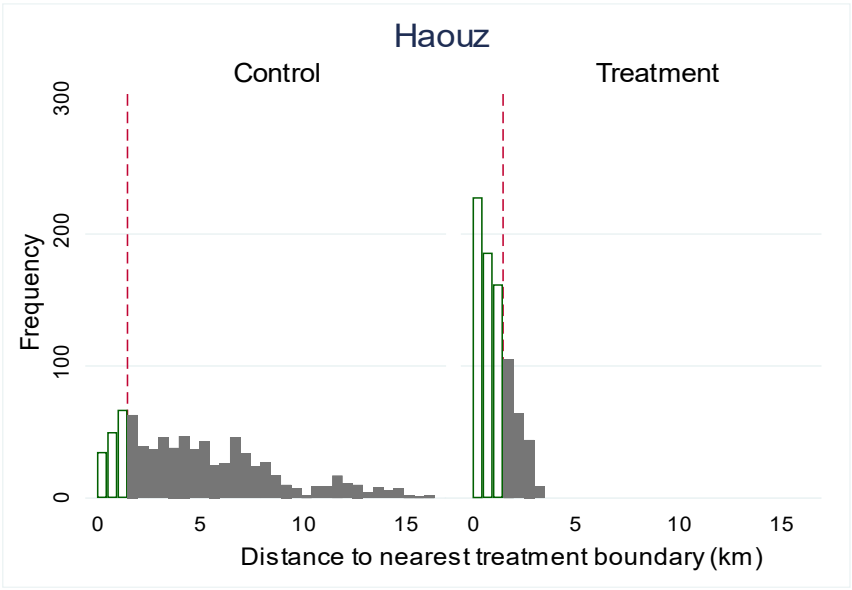
Figure I.6. Gharb: distance between parcels and boundary of nearest treated collective



Source: Farmer survey

Note: Distance to the nearest treatment boundary is measured as the distance between the centroid of the parcel and the nearest edge of any treated collective. The vertical red line shows 1.5 km. Bars in grey represents units that would be excluded from the analysis if we keep the 1.5 km bandwidth.

Figure I.7. Haouz: distance between parcels and boundary of nearest treated collective



Source: Farmer survey

Note: Distance to the nearest treatment boundary is measured as the distance between the centroid of the parcel and the nearest edge of any treated collective. The vertical red line shows 1.5 km. Bars in grey represents units that would be excluded from the analysis if we keep the 1.5 km bandwidth.

Restricting the sample to parcels 1.5 km from the boundary would estimate impacts using information from approximately 550 of 800 farmers or parcels for both regions. Finally, in analyzing the difference between treatment and control, we find that there is a reasonable degree of similarity between the control

and the treatment group for Haouz, but less so for Gharb. We conduct an analysis of the validity of the SRD and report the findings in Annex D.

Instead of using the SRD approach, we propose using a matched-comparison group design as our preferred estimate of treatment effects (Section II.D. provides further details on the methodology and this analysis). The SRD estimates could be reported as an additional check on the robustness of any impact estimates we observe.

Power calculations for impact evaluation

Initially, a spatial regression discontinuity design, which requires a higher sample size than other designs for the same minimum detectable effect, was proposed for the impact evaluation in Harris et al. 2020. As noted in the report, our initial design is also powered to use alternate identification strategies, such as a matched comparison group design using difference-in-differences estimation.

Quantitative study sample and description of sampling

This report establishes a baseline for the impact evaluation of the Rural Land Activity evaluation. The impact evaluation uses survey data from a sample of farmers that own and operate land in collectives that are part of the *melkisation* program and a sample that own land in collectives that are not part of the program. All sampled farmers are from either the Gharb or Haouz regions. The sample was selected using parcel-level data from a 2015 National Agricultural Census (*Recensement National d'Agricole* (RNA)) survey as a sampling frame. Parcels were eligible for inclusion in the sample if the owners or members of their households cultivated the parcel (rather than rented it to someone else). If the parcel owner was married, we also conducted a survey with their spouse. The original sample was selected to be representative of all collectives that were undergoing *melkisation* in Gharb and Haouz. However, data collection was halted in certain collectives in Gharb due to a perceived risk that continuing would put the project implementation at risk. As a result, the treatment sample has no observations for 15 of 52 collectives in Gharb. Further details on the study sample and sampling approach are available in **Annex B**.

Mixed-methods performance evaluation

Mathematica initially proposed a mixed-methods performance evaluation of the Rural Land Activity, combining an implementation analysis[28], quantitative trends analysis, and qualitative data analysis (Harris et al. 2020). We initially proposed to conduct a quantitative trends analysis[29] of ANCFCC land transaction data to understand whether the project resulted in reduced time for property registrations (one of the original research questions and key outcomes of interest). While we established that the data exist to create and track over time an indicator of the number of new parcels registered through *melkisation*, we were unable to obtain these data from ANCFCC after multiple requests. As a result, we will rely on qualitative data to assess this outcome as part of the endline report.

[28] The implementation analysis, to be presented in an endline report, will assess the extent to which the project was implemented according to plan (in terms of quantity and quality of outputs) and explain when and why any deviations occurred, relying on both project documentation and qualitative data.

[29] While we established that the data exist to create and track over time an indicator of the number of new parcels registered through *melkisation*, we were unable to obtain these data from ANCFCC after multiple requests. As a result, we will rely on qualitative data to assess this outcome as part of the endline report.

Qualitative study design, sample, and description of sampling

This report establishes a qualitative baseline of key outcomes for the performance evaluation, and presents findings related to key assumptions and risks in the Rural Land Activity logic model. We assess qualitatively whether the Activity is addressing the needs identified by the population at baseline. At endline, our qualitative analysis will focus on uncovering plausible mechanisms and channels that might explain why we see (or do not see) changes in investment, credit access, or land transactions because of land titling. Our qualitative study design is described in detail in Harris et al. (2020) and draws on three data sources presented in detail in **Annex B**:

1. A review of project documentation describing the optimized *melkisation* procedure (as well as the accompanying measures), key activities, stakeholders, and implementation updates.
2. Thirty-eight KIIs, including seven MCC/MCA-M stakeholders; seven government officials in the Ministries of Interior and Agriculture and the ANCFCC; six program implementers, (including both NST and the implementers of the accompanying measures); and 18 local leaders (both *caids* and *nouab*).
3. FGDs in purposively selected communes and collectives across Gharb and Haouz regions, with diverse types of farmers of collective land (men and women, large and small landholders, renters/tenant farmers, informal buyers, and recent loan recipients).

The choice of qualitative data source and method reflects the type of information we sought from each source. For example, the interactive nature of FGDs allowed us to obtain multiple perspectives and experiences and uncover social norms around key topics. KIIs were used to obtain in-depth information from stakeholders who are particularly knowledgeable about certain aspects of the project, and to corroborate or provide additional context around findings from the FGDs.

For our local KIIs and FGDs, we employed theory-based, criterion sampling at the commune and ethnic collective levels, using criteria that are most relevant to our research questions (and which cover the dimensions that might lead to different explanations) (Palinkas et al. 2015): geography (region and province), size of ethnic collective (area in ha, number of parcels and/or rightsholders), agreement/refusal to participate in and level of advancement in the optimized *melkisation* procedure (treatment collectives only), and the date of establishment of the list of rightsholders. We prioritized these criteria such that our sample size would result in saturation, which is the point when further data produce little or no new information (Saunders et al. 2018).[30] Additional detail on the qualitative sampling and recruitment approach at baseline is in Litke-Farzaneh (2022).

D. Overview of the Industrial Land Activity evaluation

Evaluation questions

The performance evaluation of the Industrial Land Activity answers the two evaluation questions using mixed methods and multiple data sources (**Table I.6**). **Annex A** provides the full list of the original EQs mapped to each of the revised EQs.

[30] Although we were able to use these criteria to select treatment collectives for Gharb and Haouz (and to match control collectives for Haouz), our selection of control collectives in Gharb was limited to geography and size, as we were unable to obtain a complete data set from ORMVAG.

Table I.6: Industrial Land Activity evaluation questions, methods, and data sources

Evaluation questions	Methods	Data sources
EQ1: To what extent was the project implemented according to plan (in terms of quantity and quality of outputs)?	• Implementation analysis • Quantitative trend analysis • Benchmarking analysis • Qualitative and descriptive analyses of outcomes	• KIIs • Investment contracts • Project documentation • MIC zone-level database • Daytime satellite imagery (Sentinel-2) • Nighttime lights satellite imagery (VIIRS)
EQ2: Did the project achieve its stated objective in the time frame and magnitude expected, as documented in the M&E Plan? Why or why not?		

Notes: KIIs = Key-informant interviews. MIC = Ministère de l'Industrie et du Commerce. VIIRS = Visible Infrared Imaging Radiometer Suite.

This report focuses on establishing a baseline that allows EQ2 to be addressed by enabling an assessment of (1) pre-intervention levels of and trends in outcomes of interest for the Industrial Land Activity; (2) the Activity's progress against key performance indicators; and (3) perceptions of the Activity's contributions to outcomes. To do so, this report presents a synthesis of baseline findings from qualitative key-informant interviews, trends in remotely sensed zone-level built-up area and nighttime luminosity, and administrative statistics on zone occupancy. Our endline report will include an implementation analysis that will address EQ1. The endline report will also extend the analyses featured in this baseline report using additional qualitative and quantitative data.

Data sources and outcomes

The baseline study relies on a combination of quantitative and qualitative data. The former come from a zone-level database, developed by MIC, that sheds light on key zone-level characteristics. Data extracted from remote sensing imagery complement these zone-level administrative statistics. The qualitative data consist of key-informant interviews (KIIs) conducted with relevant stakeholders. The qualitative sampling approach and quantitative data sources are described in detail in **Annex B.**

The performance evaluation draws on a mix of administrative and remotely sensed secondary data (**Table I.7**). First, the evaluation uses MIC's zone-level database to understand zone-wide changes over time. As of December 2022, this database includes information on the gross area, available area, occupancy rate, identity of the zone manager, and type of zone management for 150 industrial zones throughout the country. This baseline report uses these data for two purposes: (1) to identify a set of benchmark zones that may serve as useful comparisons for compact-supported zones over the longer term, and (2) to shed light on baseline land utilization patterns in compact-supported zones.

Remotely sensed data from two satellite programs will complement the insights emerging from MIC's zone-level database. First, the 10-meter resolution Sentinel-2 constellation of satellites offers daytime optical imagery with a five-day revisit time. Sentinel-2 data are commonly used for monitoring vegetation and have spectral bands that can be used for detecting built-up surfaces, such as building roofs. Next, we use nighttime lights data from the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor as a proxy for local economic activity and growth. VIIRS data are of lower spatial resolution, at 15 arc-seconds (~450 meters), but the zones are large enough that each will comprise multiple VIIRS pixels. Remotely sensed data provides an independent measure of zone performance that allows us to triangulate qualitative findings and track changes over time.

Table I.7. Performance evaluation quantitative data sources, key outcomes, and current status

Data source	Outcomes and definitions	Coverage	Frequency	Current status
Industrial zone database (MIC)	• Land utilization rate (as proxied by share of lots sold and share of lots developed) • Zone gross area (ha) • Number of newly proposed, developed, or expanded industrial zones (as listed in industrial zone database)	Industrial zones with partial or complete support from MIC in their creation and/or ongoing operations	Irregular—less than annual	• Data for 2015 acquired from http://www.zonesindustrielles.ma/ for zone benchmarking analysis to inform selection of benchmark (non-demonstration) zones and respective managers for baseline KIIs • Data from additional rounds to be acquired in upcoming years as available via https://industrial-estate.gov.ma/
Remote sensing imagery (for example, Google Earth Engine)	• Economic activity (as proxied by nighttime luminosity) • Built-up area (based on relative shares of vegetation and built-up infrastructure in the zone)	Global	Monthly composite (VIIRS); every 5 days (Sentinel-2 optical)	• Data covering 2013–2019 (VIIRS) and 2015–2019 (Sentinel-2 optical) acquired to assess baseline trends in nighttime luminosity and NDVI, respectively • Data acquisition and analyses for future years will use remote sensing algorithms developed for baseline analyses.

Notes: KIIs = Key-informant interviews. MIC = Ministère de l'Industrie et du Commerce. VIIRS = Visible Infrared Imaging Radiometer Suite. NDVI = Normalized Difference Vegetation Index.

After the EDR was approved in June 2020, Mathematica conducted KIIs with 21 stakeholders across 10 different respondent types between Q2 and Q4 of 2021 to inform this baseline report. These interviews inquired about zone management, development, and maintenance while remaining cognizant that stakeholders' responsibilities varied across those dimensions (see Annex B for additional information on the types of stakeholders and topics covered by the KIIs). These interviews aimed to establish a baseline that shed light on the early stages of the industrial land legal reform process and improved zone operations, documented the experience of establishing the CEILD and incorporation of the PPP transaction advisor, and represented the pre-intervention experiences and perceptions of zone managers and firms located within zones.

Methodology (performance evaluation)

Mathematica developed a mixed-methods performance evaluation approach that combines implementation analysis, benchmarking analysis, a quantitative analysis to track changes in key outcomes, and a qualitative analysis to uncover explanations for why particular outcomes and conditions are observed (Harris et al. 2020). This approach sought to synthesize the disparate trajectories that each component of the Industrial Land Activity might take as part of the broader Morocco Land Productivity Project. Specifically, our evaluation of the Had Soualem and Bouznika zones is intended to document how existing zones undergo rehabilitation and what their experiences are in incorporating PPP-supported practices into their operations. That of Sahel Lakhyayta will offer the example of a greenfield project in which development, management, and maintenance procedures can potentially be deployed more flexibly than in existing zones. Our evaluation of the FONZID program will focus on profiling whether the innovative economic, social, and environmental sustainability practices envisioned for the grants window have been realized, drawing on insights from a subset of six FONZID grant recipients. Finally, we will

document whether the legal and procedural changes enacted by the government, as well as practices promoted by the compact, have influenced management practices in zones outside the three PPP demonstration and FONZID recipient zones.

The mixed-methods performance evaluation outlined in the EDR represents the most rigorous approach feasible to address the EQs presented in Table I.1, given three key constraints. First, most quantitative impact evaluation approaches are not applicable, as the program will directly affect only a few zones. Second, historical administrative data that would be necessary to establish quantitative pre-treatment baseline levels are not available. Finally, identifying a suitable comparison group would require that pre-treatment data be available to assess comparability with the demonstration and FONZID grantee zones. In support of the evaluation's objectives, this baseline report aims to enable an assessment of (1) pre-intervention levels of and trends in outcomes of interest for the Industrial Land Activity; (2) the Activity's progress against key performance indicators; and (3) perceptions of the Activity's contributions to outcomes.

E. Road map for report

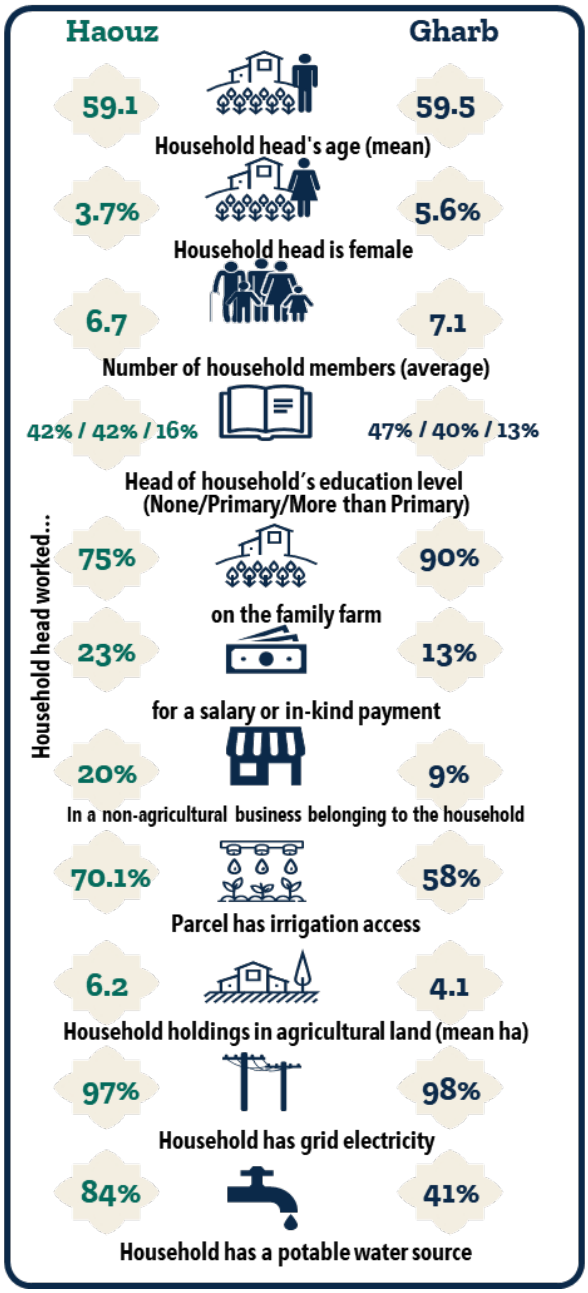
The rest of the report presents the baseline evaluation for the Rural and Industrial Activity evaluations. Chapter II reports on the Rural Land Activity Baseline. Chapter III reports on the Industrial Land Activity Baseline. Chapter IV reports on the evaluation administration.

II. Rural Land Activity Baseline Evaluation

In this section we report descriptive statistics for the key outcome domains of interest described above. The analysis is based on data from the quantitative farmer survey and is complemented by qualitative data from FGDs. These outcomes map to the program logic and form a baseline against which we will estimate impacts of the Rural Land Activity. We note that because the data were collected in August 2022, more than a year after project implementation began, many target parcels (78% in Haouz, 42% in Gharb) had undergone subdivision and a small percentage had been issued land titles by the time of the farmer survey (see annex Table C.3)[31]. As a result, certain outcomes, especially those related to perceptions of land tenure security and land ownership, reflect interim status rather than baseline. However, questions related to land markets and credit access were asked retrospectively (covering the past three to five years) and therefore are more representative of baseline status. In addition to laying out the baseline status of key outcomes, we identify any potential implications for the theory of change implied in the program logic.

We report on the baseline outcomes for the Gharb and Haouz regions separately both because of the very different climate and growing conditions in the two regions, and because we plan to estimate impacts both separately for the two regions (impacts will also be combined to report activity-level results). We also focus primarily on reporting outcomes for the treated group in each region, since these farmers represent the primary beneficiaries of the *melkisation* program. We discuss outcomes for the comparison group in the context of our discussion of statistically balance, identifying places where the households participating in

Figure II.1 Descriptive statistics of household sample



Note: N= 805 (813) for Haouz (Gharb). Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes as a result of missing values.

[31] Baseline data collection was delayed due to multiple factors, including the COVID-19 pandemic, other implementation setbacks, and extensive discussions with MCC and other stakeholders regarding the scope and length of the baseline survey.

melkisation differ in important ways from those in the control group. Finally, we validate some key outcome variables, including yield, income, and poverty to situate the study sample in the wider Moroccan context and to ensure that our data on key outcomes matches other data sources.

A. Descriptive statistics of sampled households

Figure II.1 summarizes the characteristics of our treatment survey sample by region (see annex table C.1 for additional detail). We surveyed a total of 3,212 households, of which 1,618 are treatment (805 Haouz, 813 Gharb) and 1,594 are control (811 Haouz, 783 Gharb). We find that treatment households in Gharb and Haouz are broadly similar in terms of demographic characteristics. Household heads are predominantly male, with an average age of 60 and have relatively low levels of education. Household sizes are relatively large, with roughly 7 people per household[32]. There are some differences across regions related to employment, land availability and basic infrastructure. Household heads in Haouz are more likely to work for a salary or non-farm business rather than the family farm compared to household heads in Gharb. Households in Haouz also tend to have better access to piped water from a connection to the water network. Finally, farms and target parcels tend to be larger in Haouz than in Gharb.

B. Analysis of key outcomes at baseline

The following sections report on key outcomes by region at baseline. We assess whether the constraints highlighted in the program logic are validated by baseline findings, confirming whether the Rural Land Activity was designed to address the needs of the population. Finally, we discuss implications for any risks to the achievement of the outcomes in the program logic.

Access to credit

Our baseline findings confirm that credit access at baseline is limited but highlight that an aversion to risk is likely a stronger binding constraint for most farmers. A key short-term outcome of the Rural Land Activity program logic is increased access to and lower cost of financing, which is expected to be achieved by enabling farmers to use privately held land as collateral for loan applications. This increased access to credit is expected to contribute to the increased valorization of agricultural land by enabling farmers to make investments in their land. A key assumption underlying this outcome is that the banking sector will accept land as collateral and provide credit options that are of interest to small farmers (in terms of amount, repayment timeline, interest rates, etc.).

Access to microcredit at baseline was common, but such loans were often perceived to be prohibitively small. Though in focus groups many farmers said that they were able to secure micro-credit loans, such loans were typically only 5,000–10,000 MAD (499–997 USD),[33] whereas farmers claimed to need at least 200,000 to 250,000 MAD (19,946–24,933 USD) to make a significant agricultural

[32] Morocco's High Commission of Planning reports that the average household size in Morocco in 2017 was 4.07 in urban areas and 5.17 in rural areas. See *Evolution de la taille moyenne de ménages par milieu de résidence : 1960-1950* https://www.hcp.ma/Evolution-de-la-taille-moyenne-des-menages-par-milieu-de-residence-1960-2050_a3343.html.

[33] Farmers cited being able to access microloans from financial institutions/foundations like AMANA, ZAGORA, Al Baraka, or ARDI, or from agricultural suppliers/traders who would provide temporary credit while waiting for the harvest. According to Credit Agricole Maroc (CAM), smallholder collective farmers also have access to small enterprise/project financing through Sociétés or programs like CAM's "Al Moustatmir Al Qaraoui" funded by INTELAKA.

investment. Many farmers (who possess *melk* land outside of the collective) said that in the past, it was easier to take out a loan of a greater size. Some explained that this was because they used to be able to offer larger *melk* land parcels as collateral (with inheritance over generations, the parcels have been divided among heirs).

Table II.1. Key findings on access to credit

- **Farmers are currently not applying for loans** of a size that they would consider large enough to make productivity-enhancing agricultural investments.
- A slim majority of **farmers did not apply for larger loans** (defined as loans above 25,000 MAD or $2,500) because **they either did not need the money, preferred not to go into debt, or were not willing to risk anything as collateral**. Others did not apply because they felt that **their access to loans of this size was constrained**.
- A **lack of collateral (including land titles) was identified as a credit constraint** for just 14 percent of the treatment group in our quantitative sample, but was highlighted as a major constraint in our qualitative focus groups.
- Although there is scope for *melkisation* to improve credit access by allowing land to be used as collateral, **the impact may be muted for farmers who are risk averse or do not have a profitable project**. Farmers also raised concerns about the risk to profitability associated with **climate change** and the **complicated ownership structures** that will persist due to the requirement that titled parcels meet the five-ha minimum parcel size.[34]

At baseline, households were not applying for larger loans. In **Figure II.2,** we present information on the share of households who applied for a larger loan, what households propose to do with these loans if they apply, and what reasons households cited for not applying. Applications for large loans are uncommon in Gharb and Haouz: less than 5 percent of household reported applying for a loan[35] of more than 25,000 MAD ($2,500 USD) in the past three years. Households applied for loans primarily for agricultural investments such as purchasing land, machinery, or other inputs. Households in Gharb have a higher rate of loan approval than in Haouz. Roughly 70 percent of loan applicants were approved in Gharb, whereas only 34 percent were approved in Haouz.

A lack of collateral (including land titles) was identified as a credit constraint for just 14 percent of the treatment group in our quantitative sample, but was highlighted as a major constraint in our qualitative focus groups. Just 14.8 percent of households in our quantitative treatment sample in Haouz, and 13.8 percent in Gharb, cited a lack of collateral (including a land title) as a constraint to applying for loans. However, more than half of loan applicants who did apply for a larger loan used some form of collateral to secure the loan – indicating that collateral is key to credit access. For about one-third of these cases, the collateral used was a *melk* parcel (see annex Table C.2 for more detail). Farmers emphasized more strongly in our qualitative focus groups that a lack of collateral was a major credit constraint.

Risk aversion is a strong credit constraint for most farmers, given the risks posed by drought, climate change, and high interest rates. When asked why they did not apply for any loans, half of respondents in in the treatment group in Haouz and 34 percent in Gharb responded that they preferred not to go into debt. Another 8 percent of farmers in Haouz and 9 percent in Gharb stated that they were

[34] The decision to access credit is multifaceted: It depends on several parameters and cannot be directly correlated only to the issuance of a land title.

[35] Our survey asked only about relatively large loans, defined by Credit Agricole Maroc as "meso-credit." The category is distinguished from micro-credit, which we do not ask about in the survey. It is likely that more households are engaged in small-scale borrowing, which is evident in the qualitative data. Our findings align with NST's reports that cite very low rates of credit use in the last 5 years (2% of households in Haouz and 5% in Gharb). (NST Nov. 2021, NST June 2022)

unwilling to risk anything as a guarantee (see annex Table C.2 for more detail). Despite the latent demand for credit described below (which might be met once households can use titled land as collateral), in focus groups many farmers expressed a low appetite for risk and an aversion to debt, related primarily to recurring drought and fear of not being able to make enough profit to pay the loans back, especially with the high interest rates. One farmer suggested that agriculture was no longer seen as a worthwhile investment for lenders. This risk aversion is likely to persist following *melkisation*, which will dampen any impacts on credit access. Banks take the profitability of a project into account, and with worsening climate change, it is possible that loan applications for certain types of projects such as digging wells, will be rejected by the bank (although this sentiment was not expressed directly by high-level stakeholders). This risk is exacerbated by the complicated co- or joint-ownership structures that are prevalent in Morocco and the fact that *melkisation* might increase the complexity of ownership from the bank's perspective by increasing the number of stakeholders they need to deal with for each application.

Just one lender provided uncollateralized large loans (for which farmers perceived the application requirements to be burdensome). Our qualitative data confirm that farmers are credit constrained and highlights the mechanisms limiting their access to large loans. Some female farmers were not even aware they could apply for agricultural loans. Across regions and respondent types, farmers stated that CAM was the only bank from which they could apply for meso-loans, through the *Tamwil Al Fellah* (TAF) subsidiary program. While CAM has provided uncollateralized loans (up to 200,000 MAD) to smallholder farmers since 2010 through the TAF program, most farmers believed they needed a guarantee to apply for these loans, and that CAM was not flexible on this. Farmers and *Nouab* explained that before 2018,[36] banks allowed anyone who farmed the land to provide informal documentation (a farming certificate provided by the *Caid* and signed by the collective's *Nayb*) as a guarantee, but that now only rightsholders of the ethnic collectives are granted these documents, which limits investment opportunities for the many other farmers who work on the ethnic land but are not rightsholders. Farmers also felt that because loans through TAF were tied to the size of the land parcel used as collateral (which is typically small), the loans typically made were also much smaller than the maximum of 200,000 MAD.

> *"Someone who does not have a land title today cannot be financed by practically any bank. The other banks are not interested in the rural areas in general, so farmers come to [Credit Agricole] and the only option they have is "Tamwil Al Fallah."*
>
> *—High-level stakeholder*

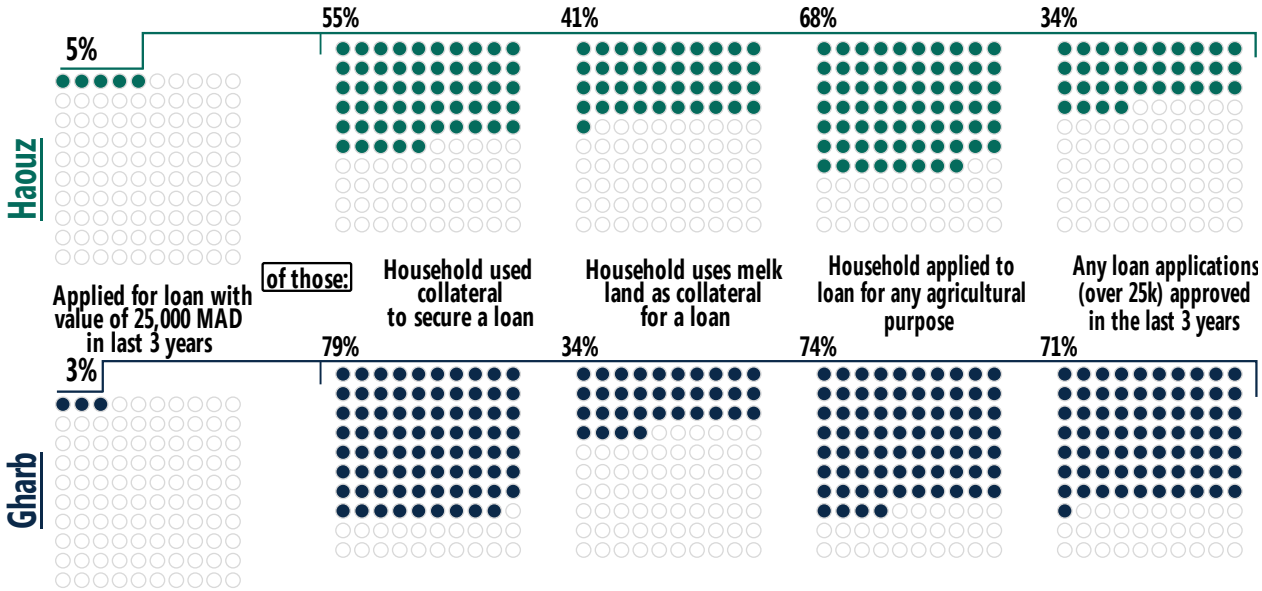
Most farmers believed that obtaining land titles through *melkisation* would improve access to credit, but some disagreed about whether it would increase the value of their land and the size of the loans for which they were eligible. Across stakeholder types, farmers stated that *melkisation* would make it easier to apply for loans because they could use their land titles as proof of collateral, which would enable them to make more investments on their land and modernize their agricultural practices. Most farmers believed that land titles should increase the value of loans they were eligible for (and CAM verified that this should be the case), particularly if they already had larger parcels. However, some smallholder farmers were skeptical, believing that the loan values would not increase, as they would still be based on parcel size (which

> *Farmer 1: "Even with a Melk parcel, the bank will not offer us any amount we want; they will base the loan amount on the size of the parcel of course."*
>
> *Farmer 2: "Sir, but the value of the land will increase, so we can ask for more money."*

[36] Farmers cited different dates, including 2015, 2018, and 2019.

wouldn't change unless a farmer's parcel were to be regrouped into a co- or joint-ownership arrangement with others to meet the minimum 5-ha parcel size requirement for *melkisation*). Most farmers also said that loan applications in the case of co- or joint-ownership after *melkisation* might lead to more complication and conflict.[37] However, this was already a challenge with collective land in the case where multiple rightsholder heirs to a parcel needed to prove that they agreed with (and granted power of attorney for) a loan application.

Figure II.2. Applications for credit, use of collateral and loan purpose



Source: Farmer Survey

Note: N= 805 (813) for Haouz (Gharb). See annex table C.2 for reasons why households did not apply for loans. Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes because of missing values. Twenty households reported submitting multiple applications or having multiple loans approved. Variables reported here are equal to 1 if at least one approved loan or application meets the criteria.

Land markets

Our baseline findings confirm that informal land transactions are common in Gharb and Haouz—both among rightsholders and with non-rightsholder buyers—suggesting that there is underlying demand for land in the project areas, and confirming that melkisation may lead to a more dynamic (legal) land market. A medium-term outcome in the Rural Land Activity program logic is that the *melkisation* program will lead to greater valorization of land and a more dynamic land market (greater and more efficient land transactions), since rightsholders will be able to legally sell, rent out, or transfer newly titled *melk* land (unlike collective land) once they have title. A risk associated with this is that a strong attachment of farmers to the land could keep market dynamics at a low level even after *melkisation*. The possibility of legal land transactions could lead to greater agricultural productivity if (1) land is transferred to operators who are more productive and have greater access to capital or productive assets,

[37] For example, one farmer was concerned that if a co-owner fails to pay back the loan, the others would be held liable and risk losing their title. Another farmer was concerned that if one co-owner applied for a loan using the land title as proof of collateral, the other co-owners would no longer be able to apply for their own loans.

or (2) farms are allowed to operate at a more efficient scale (this assumes that operational sizes are currently too small). *Melkisation* will also legally permit current landowners to sell or rent their land to people who are not members of the collective, which could increase the value of the land because potential buyers can be confident in their purchase.

Table II.2 Key findings on land markets

- **Land markets already exist** in the collectives in Gharb and Haouz, although sales and rentals are occurring through informal means, suggesting that **there is underlying demand for land** in the project areas.
- Farmers anticipate that the provision of land titles, which allow for **legal transactions, will lead to more transactions at higher prices**. This could occur because titled land no longer carries the risk for buyers associated with engaging in informal transactions and **increases the pool of potential buyers** who can legally rent or purchase formerly collective land.
- *Melkisation* is **likely to have an impact on creating a dynamic land market** in Gharb and Haouz, but the extent to which the evaluation finds impacts **depends on how decision making takes place among existing groups of owners** (for example, heirs) and for the **majority of beneficiaries whose parcels will have to be combined for the purpose of meeting the five-ha minimum parcel size**. It also **depends on the underlying fundamentals of supply and demand** that reflect the value of agricultural land and might differ importantly based on other factors such as the **availability of water**.

At baseline, nearly all land parcels are smaller than five hectares – the threshold required for *melkization* set by the GoM's *superficie minimum d'exploitation* (minimum agricultural operating area). In **Table II.3**, we present information on how much land households hold, whether households purchased or sold collective land, and the extent of their engagement in land rental markets. Land is somewhat more abundant in Haouz, which may be reflected in larger agricultural landholdings. The average landholding,[38] which includes all parcels owned or operated by the household, is about 6 ha in Haouz compared to 4 ha in Gharb. The average target parcel is 1.4 ha in Haouz and 1.7 ha in Gharb. Nearly all target parcels (96% in Haouz, 96% in Gharb) are smaller than 5 hectares. Given that the minimum land size for *melkisation* (as defined by the Ministry of Agriculture) is 5 hectares, this finding indicates that a large majority of parcels would need to be regrouped with other parcels to undergo *melkisation*.

[38] The survey collected detailed parcel-level data on all agricultural parcels owned or operated by the household, regardless of the legal status of the land. While some households own *melk* parcels, 94 percent of parcels in Haouz and 92 percent of parcels in Gharb are collective land. We do not collect data on the location parcels owned or operated by the household, other than the target parcel, which we know is in the collective.

Table II.3. Acquisition of target parcel and engagement with land markets

Indicator	Haouz Treatment	Gharb Treatment
Area of household holdings in agricultural land (mean ha)	6.2	4.06
Area of target parcel (mean ha)	1.44	1.66
Target parcel is under 5 ha (%)	95.6%	95.7%
Mode of acquiring target parcel:		
Purchase (%)	29.6	7.4
Inheritance from family (%)	50.3	54.6
Transfer from govt./local authority/customary grant (%)	15.4	30.8
Inheritance through marriage inheritance, gift, partnership, or assoc. (%)	4.4	6.4
Year the target parcel was acquired (average)	1997	1992
Household participates in rental market (rents in or out agricultural land) (%)	5.8	15
Household rents in any agricultural land (%)	1.2	7
Household rents out any agricultural land (%)	4.5	8.1
Type of rental agreement (conditional on renting in or out):		
Short-term rental (in or out) (%)	15.8	42.6
Long-term rental (in or out) (%)	11.7	42.5
Sharecropped (%)	65.2	20.2
Borrowed/lent or offered free (%)	13	7.3
Area of rented land		
Area of rented in agricultural land (mean ha)	0.04	0.32
Area of rented out agricultural land (mean ha)	0.12	0.22
Annual rent per ha (mean MAD/ha)	18,310	5,442
Annual rent per ha (median MAD/ha)	1,836	3,659
Household sold any land in the last 5 years (%)	11.1	1.1
Sold collective land (%)	90.9	94.5
Sold *melk* land (%)	11.7	5.5
N	805	813

Source: Farmer Survey

Note: Sample sizes shown are for the largest sample, but some variables might have smaller sample sizes because of missing values. The area of parcels was imputed using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 ha. Area was also top and bottom coded at the 1st and 99th percentile. We report both mean and median of annual rent per ha because of small sample sizes. Very few treatment parcels were rented in or out (14 in Haouz, 89 in Gharb), so these data are prone to outliers. Annual rent per ha was calculated by top and bottom coding annual rent (for parcels rented in or out) at the 5th and 95th percentile, and then dividing by parcel area.

At baseline, there are active informal land markets for collective land operating in both regions, though sales are more common in Haouz and rentals are more common in Gharb. Land markets and the mode of transacting land also differ across regions. Although infrequent in both regions, land sales are

more common in Haouz, and Gharb sees more rentals. Nearly 30 percent of Haouz[39] respondents stated that they had purchased their target parcel, and more than 10 percent reported selling a parcel (sales were asked about over the past 5 years). In contrast, fewer than 10 percent of Gharb households reported acquiring the target parcel via a purchase, and fewer than 2 percent reported selling land (sales were asked about over the past 5 years). In both regions, more than 90 percent of parcels sold were collective land. The difference in the prevalence of land sales across regions is reflected in different perceptions about land rights and legal knowledge: respondents in Haouz report having the right to sell land and incorrectly state that the law permits selling collective land (see section on tenure security, conflict, and legal knowledge below for further discussion). Land rental is more common in Gharb: 15 percent of households in Gharb participated in rental markets (7 percent rented in land, 8 percent rented out land) compared to 6 percent in Haouz (1 percent rented in land, 5 percent rented out land).[40] The nature of the rental arrangements also differs by region. In Gharb, short (less than three years) or long-term rentals were the most common type of rental agreement, and in Haouz, most households engage in sharecropping.

Farmers confirmed that collective land transactions were illegal; however, informal rentals and sales were both very common and easy prior to 2019, between both collectivists and non-collectivists. Focus groups confirmed that the only form of legal collective land transfers were through "*Tesrate*," a yearly process in during which unused land is transferred to collectivist heirs who had not yet been attributed land. However, interviews and focus groups confirmed the prevalence of informal transfers of collective land through "*tesslim*" or "*tanazol*" contracts. Otherwise known as "deeds of renunciation," these contracts served as legally non-binding transfer contracts that documented the land transaction and its cost, but were not certified by any authority. These contracts were common between collectivist heirs, but also between collectivist and non-collectivist ("outsider") buyers. Regardless, many of these informal buyers had been farming or living on the land for many years after the transaction (and in some cases where informal buyers were deceased, their heirs had continued farming the land). Informal transactions slowed or stopped after 2019, when legislation was passed that inflicted more severe penalties for informal sales, making it a criminal offense to buy and sell collective land to someone who isn't a member of the ethnic collective. Farmers did not mention that law itself but cited 2019 as a pivotal year and reported that transactions stopped around this time. They claimed that this was when some of the *melkisation* implementation processes were beginning.

> *"Theoretically, it is very difficult to buy or sell, because this kind of land transaction on collective land is prohibited by law. But in reality, these are easy, quick, and very frequent operations."*
>
> —*Informal buyer*

Farmers in Gharb felt that land markets were tightening because of increased demand, whereas farmers in Haouz felt there was an abundant supply of land (but of poorer quality). In focus groups, Renters in Gharb said that it was becoming harder to find land to rent, and that therefore, rental prices were increasing consistently. By contrast, sharecroppers in Haouz felt that the supply of land was

[39] Analysis of the parcel and household survey conducted by NST in this region confirms that informal sales of collective land using a *contrat de renonciation* are common. NST notes that transactions are usually occuring between members of the ethnic collective, either rightsholders or other collective members. (NST Nov. 2021, NST June 2022)

[40] Note that these measures of land rental markets provide only a partial picture. The eligible sample was restricted to households that own and operate their parcels, so the frequency of land rental reported may understate the true prevalence of land rentals, as we have excluded absentee landlords and tenant farmers by construction. As a result, we capture only the rental of parcels other than the target parcel rented in or out by owner-operators.

abundant, as many people were unable to farm their collective land. However, this was due primarily to challenges with drought and a lack of irrigation. These farmers explained that rental prices varied by seasonal demand, depending on rainfall.

Collectivist farmers believed that their land would gain value and that legal land transactions would ensue after *melkisation*. Farmers with sole-use rights to the land believed that land titles would benefit them by enabling them to make decisions independently of the collective, and to access credit (as mentioned above). They believed that the combined effect of increased agency and agricultural investment would make land markets more dynamic, not so much in the frequency of transactions (since informal transactions were already common) but more so in the value of the land exchanged and the potential gain in price. A number of farmers noted that the announcement and launch of the *melkisation* program cooled land market activity both because owners anticipated being able to sell for more once the land was titled, and informal buyers perceived a heightened risk of engaging in land transactions prior to *melkisation*. The project logic assumes that the "fluidity of land transfers will potentially lead to the emergence of farms of more viable size." Certainly, some farmers noted that they could sell their land to potential investors that would presumably consolidate parcels.

> *"When I bought my plot (in 2015), the price was high, and farmers were racing to buy as much land as possible. Land transactions were easy at the time. But over the years, it became more complicated because of the drought and the distinction between rights holders and non-rights holders. This was enough to cause a dramatic drop in collective land prices."*
>
> *—Informal buyer*

However, farmers were concerned that co- or joint-ownership could complicate decision-making about melk land transactions. As described above, nearly all target parcels in our quantitative treatment sample were less than 5 hectares and as such would need to regroup in order to undergo *melkisation*. As such, they would remain under "*petite indivision*" (joint or co-ownership). Farmers in focus groups expressed concern that co- or joint-ownership could impede market dynamics by complicating decision-making regarding land transactions, just as in the case for credit applications (mentioned above).

> *"Imagine a shared car with several people, and each of them wanting to go to a different destination. It is normal that shared ownership will influence the overall decision-making process. This is exactly the case for collective land."*
>
> *—Informal buyer*

Farmers did not commonly express a reluctance to sell or rent their land after *melkisation*, but some high-level stakeholders were concerned about this. One of the risks in the Rural Land Activity logic model is that a strong attachment of farmers to the land could keep market dynamics at a low level even after *melkisation*. Although it is true that farmers are attached to their land, transactions are historically very common in the collectives, as noted previously, even if that means keeping the transactions within the ethnic collective. There are many reasons that farmers decide to rent out or sell their land: some lack the resources to invest in their land, some lack the time to work on the land, and other have decided to move to a city or emigrate. In addition, farmers wanted to see their land become productive: many interviewees expressed a desire to plant and produce and sorrow at seeing land left unused because of external circumstances such as drought. The farmer interviews did not reveal any strong opposition to transacting with people from outside the collectives.

Tenure security, conflict, and legal knowledge

Our baseline findings[41] indicate that while specific sub-groups have high rates of tenure insecurity at baseline, this is not the case for male collectivist landowners who represent most owner-operators in our quantitative sample. Two short-term expected outcomes of *melkisation* are (1) to provide more secure, formal rights to land, and (2) to improve landowners' knowledge of their legal rights. The program logic assumes that giving landowners private titles that verify their land ownership will not only protect their rights but will also improve their perceived tenure security. As part of the information and sensitization campaigns, participants in the *melkisation* program are also expected to gain a better understanding of the regulations regarding collective and *melk* land, creating a virtuous cycle of greater tenure security. The program logic also assumes that the process of identifying owners and demarcating land boundaries through the *melkisation* procedure will be a contributing factor to reducing conflicts between neighboring parcel owners, a medium-term outcome in the program logic. Ultimately, greater tenure security and reduced conflict over land would increase owners' willingness to make productive investments in their land.

Table II.4. Key findings on tenure security, conflict, and legal knowledge:

- **Tenure security is high, and rates of conflict are low** for male collectivist landowners, who represent most owner-operators in our sample.
- **Specific sub-groups**, including women, informal non-collectivist buyers, renters/sharecroppers, and in some cases, youth, **report much higher tenure insecurity at baseline.** For women, tenure insecurity usually **stems from within the extended family around issues of inheritance**. For other groups, like renters and informal buyers from outside the collective, they may experience a **deterioration in tenure security and heightened conflict because of melkisation.**
- **Rates of co- or joint ownership are high,** and even though households are gaining titles, joint-ownership and the associated pressures exerted by extended families can undermine the impacts of stronger tenure security achieved through the ***melkisation*** program.
- A registered land title will provide program beneficiaries with a strong, documented, legal right to their land. However, **impacts on perceptions of tenure security will be limited** by the strong de facto property rights regime already in place for most landowners (those who are men and members of the collective) and the low reported rates of conflict.
- Greater legal knowledge in inheritance and enshrining the right to land through inheritance acts could have **big impacts on tenure security for women.** However, the extent to which these impacts lead to more equitable access, contributing to a change in **agricultural productivity might depend on deeper shifts in cultural norms regarding the role of women in agriculture.**

At baseline, owners in the quantitative sample report that they have secure, documented tenure, though this sample primarily represents male collectivist landowners. The qualitative data confirm that male collectivist landowners were typically tenure secure at baseline. In **Figure II.3**, we report information on whether owners have documented land use rights, the structure of ownership and their subjective perceptions of tenure security and conflict. We measure tenure security through both documented use rights and the owner's subjective understanding of those rights. security and conflict. We measure

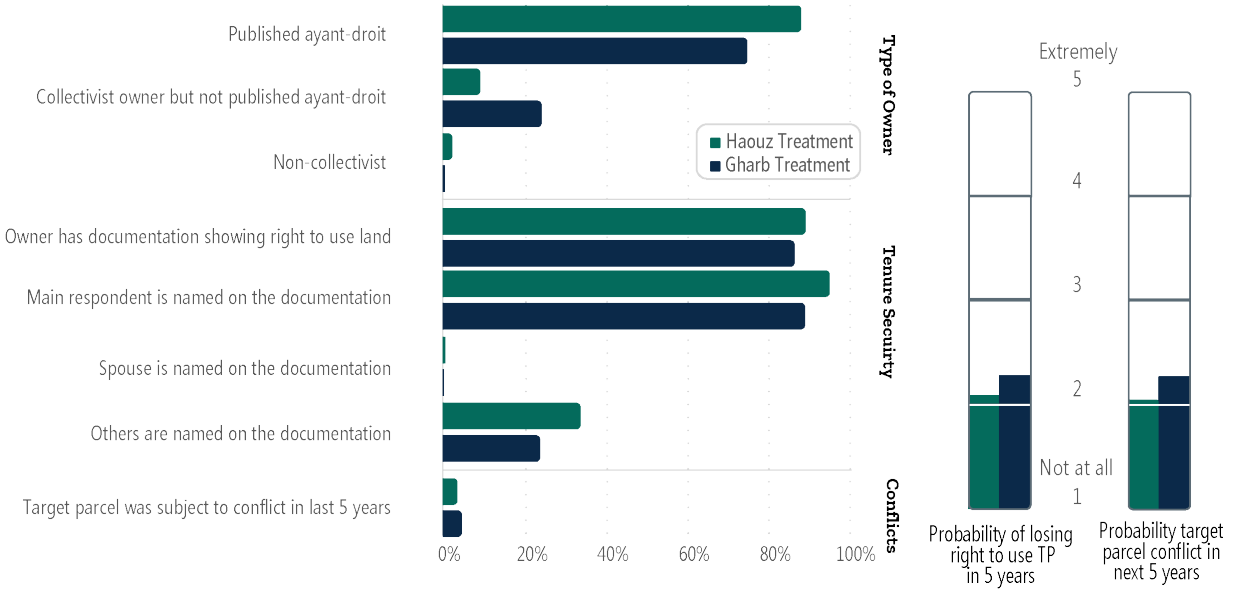
"Many problems arise from inheritance decisions. Disputes that can go as far as bodily violence (throwing stones, etc.). Sometimes the cops intervene."

—Female farmer

[41] Because the data were collected in August 2022, more than a year after project implementation began, many target parcels (78% in Haouz, 42% in Gharb) had undergone subdivision and a small percentage had been issued land titles by the time of the farmer survey (see annex Table C.3). As a result, our findings on perceptions of land tenure security and land ownership may reflect interim status rather than baseline.

tenure security through both documented use rights and the owner's subjective understanding of those rights. Most households in the quantitative sample report that they or someone in their household is named on the published list of rightsholders (*ayants-droits in French),* and only 2 percent of Haouz households and 0.5 percent of Gharb households report being a non-collectivist owner.[42] More than 85 percent of landowners in Gharb and Haouz report having their name on a legal document demonstrating their right to use the land, though these documented use rights are shared with other people: 34 percent of landowners in Haouz and 25 percent in Gharb report that at least one other person excluding their spouse is named on the document. Female spouses are almost never named on legal documents demonstrating land use rights.

Figure II.3. Legal status and documentation of tenure, incidence of conflict and perceptions of tenure security



Source: Farmer Survey

Note: N=805 (813) for Haouz (Gharb). Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes because of missing values. The most common forms of documentation (more than 10%) showing the right to use land include an operating certificate, the published list of *rightholders,*a waiver or withdrawal, or a receipt of participation in NST survey. Other forms of documentation include an inheritance deed, a legalized contract, a purchase deed, a certificate of customary ownership, or a transaction deed. Less than 1 percent of respondents said they have a parcel division plan, a *Moulkiya* act, a building permit, a land title, electricity bills, a receipt from ANCFCC, or a lease contract.

[42] These rates do not align with information reported by NST on the number of published rights-holders and non-collectivist owners in Gharb and Haouz (discussed in detail in Annex E). The misalignment is due in part to the timing of the survey, which occurred after the NST data was collected and after the published lists of rights holders was updated. Respondents might consider themselves a named rightsholder if they are listed among the heirs of a deceased rightsholders. We also find very few people who report that they are non-collectivist owners compared to what NST reports. This may be attributable to people not wishing to disclose their status as non-members of the collective.

Landowners in the quantitative sample almost all feel secure in their tenure[43] and are not worried about losing their land in the next five years, though respondents in Gharb report slightly higher average expectations (1.3 vs. 1.1 on a 5-point scale, with 1 = Not at all, 5 = Extremely) In both regions, there is no major difference between the opinions of principal respondents and their spouses. When asked why they believe they might lose their land rights, survey respondents were more likely to answer that the government might seize the plot, whereas spouses are more likely to express concern over the death of a household member.

Reported rates of recent conflict were low in our quantitative data, and respondents do not anticipate experiencing future conflicts. Fewer than 5 percent of landowners in our quantitative sample reported experiencing a conflict in the past five years related to the target parcel and do perceive future conflicts as extremely unlikely (1.26 vs. 1.04 on a 5-point scale, with 1 = Not at all, 5 = Extremely) (**Figure II.3**). The low levels of conflict reported in the survey could reflect a reluctance on the part of respondents to share information about personal or legal matters, but the findings triangulate with findings from focus group discussion where respondents might feel more at ease. In focus groups with male collectivists (typically rightsholders), respondents frequently referred to themselves as "pacifists." Though some mentioned that conflicts sometimes arose over parcel boundaries, the most frequent disagreements occurred over inheritance. These conflicts were often resolved within the family, and if this was not possible, with the support of the *nouab* or elders, and sometimes through the courts.

Other stakeholder groups not well reflected in the quantitative survey, including women (female spouses and heirs), informal non-collectivist buyers, renters/sharecroppers, and in some cases, youth, expressed in focus groups higher rates of tenure insecurity and related concerns about the *melkisation* program. These were all important stakeholder groups not well reflected in the quantitative survey data[44] and so were specifically targeted as part of the qualitative data collection. Below, we discuss how tenure security varied across these stakeholder groups according to our qualitative data.

Women in focus groups expressed being tenure insecure since they were rarely listed as rightsholders and in the past did not inherit collective land, based both on customary gender norms and laws around collective land management that historically favored men (see Harris et al. 2020 for more detail on the history of collective land rights in Morocco). However, many female collectivists were optimistic about the prospect of *melkisation* formalizing their rights, due likely to the recent passage of two laws that enabled women for the first time to both benefit from the proceeds of and inherit collective land (see Section III.C.3 *Gender and social inclusion* below for more detail on the topic).

[43] The survey items capturing tenure security and land ownership are aligned with the definitions underpinning the SDG indicators 1.4.2 and 5.a.1. Indicator 1.4.2 measures tenure security by looking at legally recognized documentation and subjective perceptions of tenure security. Indicator 5.a.1 measures ownership or secure rights over agricultural collective land "mother title" on whether an individual possesses a legally recognized document in their name, reports the right to sell or reports the right to bequeath land. We use these definitions to determine land rights and tenure security, but we do not calculate the indicators themselves; they are typically expressed as proportions of a population and disaggregated by gender.

[44] Informal buyers from outside the collective were eligible to be included in the survey. However, the final sample did not include many people who self-reported that they were such. Informal buyers are concentrated in certain collectives, which were in some cases dropped from the quantitative survey because of tensions in the community and a perceived risk that collecting data in these collectives could undermine the success of the *melkisation* program. Because the quantitative survey targeted owner-operators of land, it also led to women being underrepresented in (and renters being absent from) the quantitative sample.

In focus groups, informal buyers said that they were somewhat tenure secure prior to the *melkisation* program, but were concerned about losing their access to the land as a result of the program.[45] These stakeholders had informally purchased land from collective members in the past. Informal buyers reported that during earlier attempts at *melkisation,* which began in 1969, conflicts arose between non-collectivist informal buyers and collectivist heirs during the establishment of rightsholders lists. Informal buyers were concerned that previous documentation of a land transfer from a deceased rightsholder would become obsolete should heirs reclaim their inheritance right and be included on the published rightsholder list.

"I am afraid of losing the right of access to my land permanently because in the eyes of the authorities, we are treated like foreigners who have no rights. And I still wonder how I was able to buy almost 28 hectares and spend huge sums to maintain it to find myself today with no document proving my relationship to this land."

—Informal buyer

In focus groups, renters and sharecroppers of collective land also expressed tenure insecurity. To increase their security, rather than making informal arrangements, many renters and sharecroppers cited signing contracts with the length of time and the price, which were sometimes notarized by local authorities. Renters' tenure insecurity stemmed primarily from experiences with (or fears related to) having rental agreements cancelled or not renewed after the renter had made significant investments (in time and money) into the land. For example, in some cases renters said they were outbid by someone else on the rental price. However, some renters said they were not concerned about tenure insecurity with renting the land, or the prospect of *melkisation,* as they planned to relinquish the land when the lease was up.

Heirs may also be a group that faces higher rates of tenure insecurity in certain collectives, although this group was not well represented in either our quantitative or qualitative data collection. Thirteen collectives dropped out of the *melkisation* procedure—some at the outset and some during the process of establishing the rightsholders lists—primarily because male heirs who were not on the rightsholder lists were concerned they would lose their ability to access the land (since they were concerned that they would not be identified by name on the updated rightsholders lists, but rather as an anonymous "group of heirs" – although this was resolved through the provision of inheritance acts). At MCC's request, farmers from these collectives were not sampled in either our qualitative or our quantitative data collection.

Perceptions of co- or joint ownership[46] of the target parcel were also prevalent at baseline—more so in Haouz (42 percent) than in Gharb (25 percent)—which could complicate decision-making around land. However, project implementation was already underway at the time of data collection and many land parcels (78% in Haouz, 42% in Gharb) had already undergone subdivision operations. As a result, perceptions of land ownership represent an interim status rather than baseline. It is also important to note that this finding reflects farmers' perceptions of *'de facto'* property ownership rather than legal standing (*de jure*) (i.e., even if the respondents did not yet have land titles, they may have perceived their parcel to be in joint or co-ownership because they were anticipating *melkisation*). At baseline, all collective land is technically held in joint ownership with the entire collective, or "*grande indivision*";

[45] Key informants explained that informal buyers will not receive a title through the optimized *melkisation* program but will be allowed to continue to operate their parcels with the title held in the name of the collective. Although this makes them no worse off from a legal standpoint, this was not always well understood by the informal buyers themselves, which likely reflects the fact that this decision came about after a drawn-out process of negotiation between GoM and MCA-M, during which many solutions were discussed to attempt to "regularize" informal buyers' situations (in other words, secure their land tenure).

In Haouz, 28% of households reported that the target parcel was held in joint ownership and 14% reported co-ownership. In Gharb, 16% of target parcels were held in joint ownership and 9% were held in co-ownership. These results reflect the perceptions of the survey respondents' or *'de facto'* property owner rather than legal standing (*de jure*).

however, parcels themselves may be operated and *de facto* owned either solely or jointly. Because parcels smaller than 5ha must be regrouped into "*lots*" with other parcels to receive a title, following *melkisation* they will still be held in joint ownership with undivided shares ("*petite indivision*"), or in co-ownership with divided shares.

Among households that report holding a parcel in co- or joint ownership, the average number of owners is greater than five in both regions. These other people are often involved in important decisions about land and share the right to sell or bequeath land with the primary respondent. Owners of parcels held in joint-ownership report that they need to consult with many more people when it comes to making economic decisions or decisions about transactions of collective land, reflected in the percentage of households that must consult with people other than the main respondent or spouse (**Table II.5**). About 32 percent of Haouz households and 23 percent of Gharb households include other people when making decisions to sell the target parcel, rates that are similar when it comes to decisions around bequeathing or using the target parcel as collateral. A key exception is around inheritance decisions. Many households in both districts (52 percent in Haouz, 23 percent in Gharb) answered that inheritance is solely decided by Moroccan law. However, for respondents that attribute these decisions to household or family members, we find that multiple people are usually consulted (including the spouse). In fact, decisions about inheritance are the only area in which spouses are consulted (spouses are almost entirely excluded from land rights and decision-making regarding land, which reflects the persistence of norms about gender and land use in the project areas; see Section II.C.3.i. *Gender and social inclusion* below for more detail on the topic).

Awareness and understanding of legal reforms regarding inheritance and the right to sell land may improve because of the *melkisation* program. The survey was conducted after information and sensitization campaigns had already started, so it is possible that respondents already received information about legal reforms involving inheritance and the right to sell *melk* land. Nevertheless, fewer than half of respondents were aware of the new inheritance laws (**Figure II.4**). Of respondents who had heard of new inheritance laws, almost all correctly understood how the application of *sharia* law determines the relative shares for male and female heirs (see Table C.4 for further detail). However, many respondents incorrectly believed that it was legal to sell collective land outside of the collective. Slightly over half of Gharb respondents (55 percent) correctly understand that collective land cannot be sold by an individual, but only a minority of Haouz respondents (12 percent) do. This difference is also reflected in the shares of households in Haouz that report acquiring their collective land through purchase (see Table II.3 on land markets for more detail).

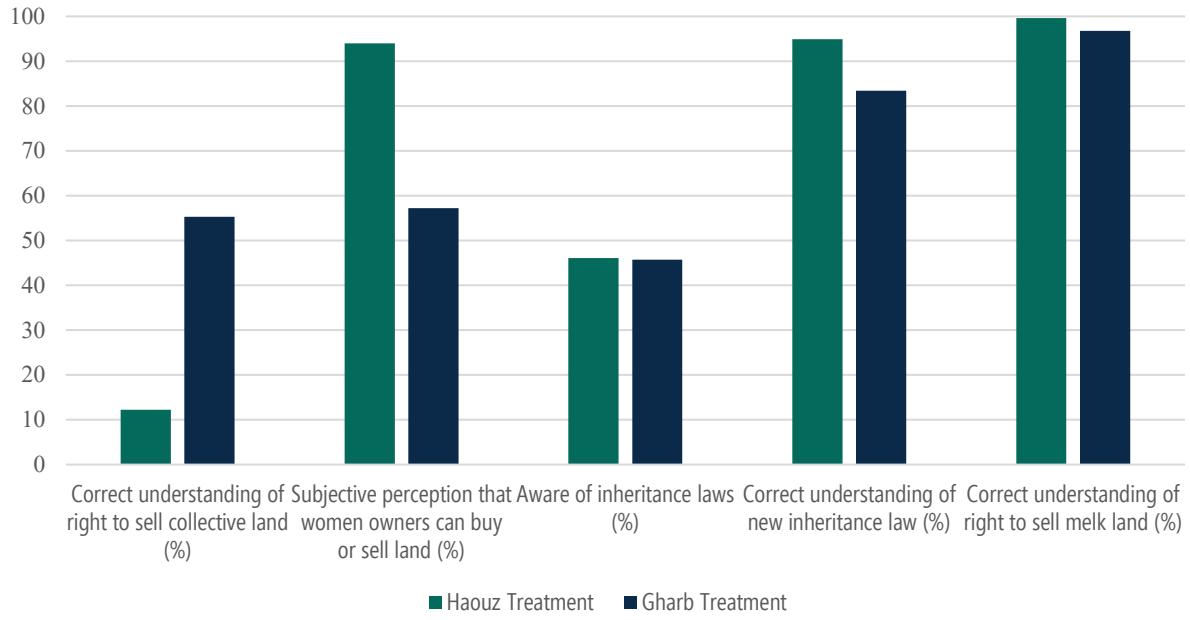
Table II.5. Rates of joint ownership , decision-making and shared land rights

Indicator	Haouz Treatment	Gharb Treatment
Ownership structure		
Target parcel is held in co- or joint- ownership (%)	41.6	19.1
Number of owners for target parcel held in co- or joint ownership (mean)	5.06	6.37
Land rights & decision making		
Main respondent or household has the right to sell (%)	77.4	30.9
Who has the **right to sell** the target parcel:		
Main respondent (%)	98.7	98.6
Spouse (%)	0.3	0.2
Others have the right to sell (%)	34.2	12.2
Who is decision-maker on target **parcel rental, sale, or transfer:**		
Main respondent (%)	97	97.6
Spouse (%)	1	1.9
Others are decision-maker on target parcel rental, sale, or transfer (%)	32.4	23.2
Main respondent or household has the **right to bequeath** (%)	74.1	26.9
Who has the **right to bequeath** the target parcel		
Main respondent (%)	98.6	97
Spouse (%)	0.3	2
Others have the right to bequeath (%)	35.6	22.8
Who is decision-maker on using target parcel as **collateral**		
Main respondent (%)	96.8	97.7
Spouse (%)	1.9	2
Others are decision-maker on using target parcel as collateral (%)	34.4	23.4
Who is decision-maker on target parcel **inheritance**		
Main respondent (%)	37	53.8
Spouse (%)	15.2	24.3
Others are decision-maker on target parcel inheritance (%)	32	31.9
N	805	813

Source: Farmer survey

Note: Sample sizes shown are for the largest sample, but some variables might have smaller sample sizes because of missing values. This table reports responses from the main respondent only. Indicators describing the spouse are missing for households where the main respondent is not married or did not report a spouse in the household roster. The spouse perspective is described in section II.C. Gender and social inclusion. For each parcel, respondents were asked how many people are co-owners of the parcel. We use the average per household to calculate “Average number of owners per parcel in joint ownership.” “Others” are defined as non-household members or household members that are neither the main respondent nor the spouse.

Figure II.4. Awareness and knowledge of inheritance laws and rights to sell land



Source: Farmer survey

Note: N= 805 (813) for Haouz (Gharb). Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes because of missing values. This figure reports responses from the main respondent only. (We report spouse's legal knowledge in annex Table C.4). We code respondents as having the "correct understanding of right to sell collective land" if they answer "No" to "According to your understanding of the property laws in Morocco, can owners of collective land sell the land?" Respondents have the "correct understanding of new inheritance law" if they answer "Half of the brother's share" to the question "Based on your understanding of the new law, if a rightsholder dies and has one son and one daughter, what share will the daughter inherit?" Respondents who answer "Yes" to "According to your understanding of the property laws in Morocco, can owners of *melk* land sell the land?" are coded as having the correct understanding of their right to sell *melk* land.

A registered land title will provide program beneficiaries with a strong, documented, legal right to their land. However, the extent to which this change leads to increased perceptions of tenure security is limited by the strong de facto property rights regime already in place. Perceptions of tenure security among owners who receive a title are unlikely to change (especially those who are men and those who are members of the collective), since most people already report feeling secure in their tenure. Unless the prevalence of *co- or joint-ownership* changes as part of the *melkisation* procedure, which may be unlikely, the risks to tenure security that arise from family pressure may remain in certain cases.

Although objective measures of tenure security will improve for a large majority of landowners and the *melkisation* procedure may reduce conflicts by resolving disputes, there may be specific collectives or sub-populations where this does not occur. Greater legal knowledge about inheritance and enshrining the right to land through inheritance acts could improve tenure security for women by ensuring they are listed on titles, ultimately leading to greater and more equitable access to land for this vulnerable group. When and if their land rights are formalized, it is also possible that perceptions of tenure security will increase for women, who are currently more vulnerable (see discussion in Section 3.i below for more details). The degree to which we will observe an effect depends not just on including women on titles, but on deeper cultural shifts and the acceptance of new norms around women's land ownership. The extent to which greater land rights for women also translates into increased agricultural productivity depends on the role of women in agriculture. Typically, women are not involved in

agricultural decision making and are not empowered (see discussion in Section II.C below). Likewise, as described above, informal buyers or renters might feel less secure in their tenure because of the *melkisation* program, undermining their incentive to invest in their land. Informal buyers remain at risk and their tenure security depends on whether a legally acceptable resolution can be implemented.

Agricultural investment and practices

Our baseline findings confirm that agricultural investments and modern agricultural practices are limited, most commonly due to a lack of credit and risk aversion. One of the medium-term outcomes of the Rural Land Activity program logic is increased investment in inputs and modernized agricultural techniques (either to increase the productivity of existing crops, or to diversify/switch to different crops). The program logic assumes that newly titled farmers will be incentivized to invest in the productivity of their land to increase land tenure security. There are two assumptions linked to this outcome: (1) that rightsholders will benefit from subsidies granted by the government as part of Morocco's Green Generation 2020–2030 agriculture strategy,[47] as well as credits from the banking sector, and (2) that the fluidity of land transfers will potentially lead to the emergence of farms of a more viable size. In addition, co- or joint-ownership and the requirement for parcels to be a minimum of five ha could in certain cases pose a risk to achieving this outcome by slowing down the market dynamics and the valuation of land and complicating joint decision-making on agricultural investments and land use.

Table II.6 Key findings on agricultural investments and practices:

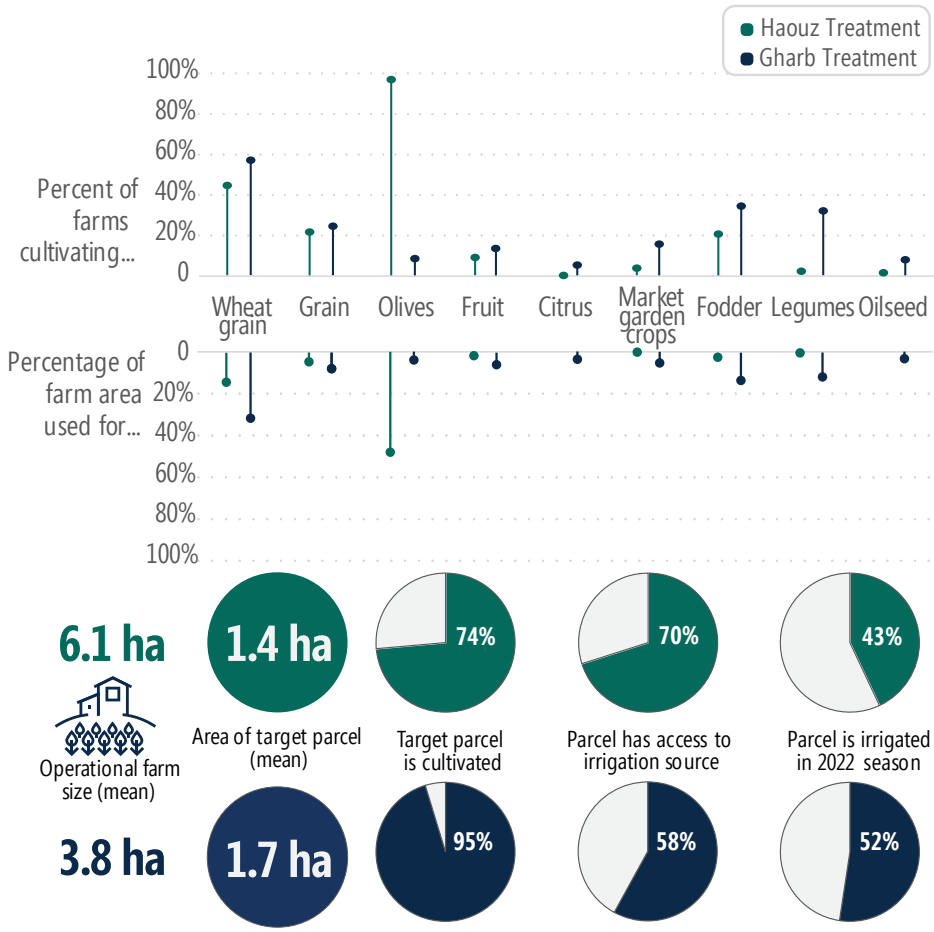
- **Gharb and Haouz differ in land use and cultivation practices,** with Gharb more input intensive and having higher ownership of productive assets compared to Haouz.
- **In Haouz, olives are the primary crop,** followed by cereals and fodder. **In Gharb agricultural practices are more diversified,** with some households growing fruits, vegetables, and other cash crops, in addition to cereals and fodder crops.
- The **use of hired equipment, improved seeds, and fertilizer is more common in Gharb than in Haouz**, and expenditure on all inputs excluding irrigation is higher in Gharb. Irrigation costs account for about 30 percent of expenditures in Haouz compared to 10 percent in Gharb.
- **Melkisation may have an impact on agricultural investments** and practices if farmers can use their titles to unlock access to capital (or if they sell to others with more resources). **Farmers in both regions see opportunities** to make greater investments in their land and change agricultural practices after receiving titles, particularly by investing in improved irrigation and shifting agricultural production towards fruits, high-value market vegetables, and livestock, though farmers anticipate needing the help of government subsidies or access to credit.

At baseline, Gharb and Haouz differ considerably in the types of crops being cultivated, the use of inputs and the existing levels of investment and ownership of productive agricultural assets. In **Figure II.5** we report information on how households are using their land at baseline, including whether they cultivate on the target parcel and the types of crops being grown in each region (see annex Table C.5 for further detail). Gharb and Haouz have different land use and cultivation practices, including in the type of crops that are grown and the use of inputs—differences that reflect different land pressures, agro-ecology, climate, and economies. In Haouz, 73 percent of target parcels were cultivated during the 2022 agricultural season. In Gharb, 95 percent of target parcels were cultivated. The observed difference across

[47] Although this strategy is part of the Project's revised M&E Plan, it was not mentioned in the compact design documents or original M&E plan, and therefore was not incorporated into our qualitative protocols. As a result, it was barely mentioned in focus groups or KIIs, and so we do not analyze whether this assumption will hold true. We intend to ask more explicitly about this program at endline.

regions could be a result of acute rain shortages in 2022 agricultural season, which forced many farmers in the Haouz region to abandon fields and olive groves because they did not receive enough water.[48] Agriculture in Haouz is focused primarily on the cultivation of olives, cereals (primarily wheat), and fodder, though some households also cultivate fruit (<10 percent). Olives are by far the most popular crop, as more than 90 percent of Haouz farmers grow them on land that accounts for nearly 50 percent of the overall farm area[49]. Across Gharb, farmers are most likely to grow cereals (especially wheat), fodder, and legumes. However, some Gharb farmers also cultivate market garden vegetables (16 percent), fruits (15 percent), and oilseeds (8 percent).

Figure II.5. Cultivation patterns, crop choice and access to irrigation



Source: Farmer survey

Note: N= 805 (813) for Haouz (Gharb). Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. The area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 hectares. The predicted area was then top and bottom coded at the 1st and 99th percentile. Crops are categorized using

[48] Although the Haouz region is located inside an irrigation perimeter, insufficient water in the reservoir that feeds the large-scale irrigation system means that although households have access to the large-scale system, there is no water. Households most often rely on private wells.

[49] We define the operational size of the farm as all agricultural land owned or operated by the household, excluding land that is rented out.

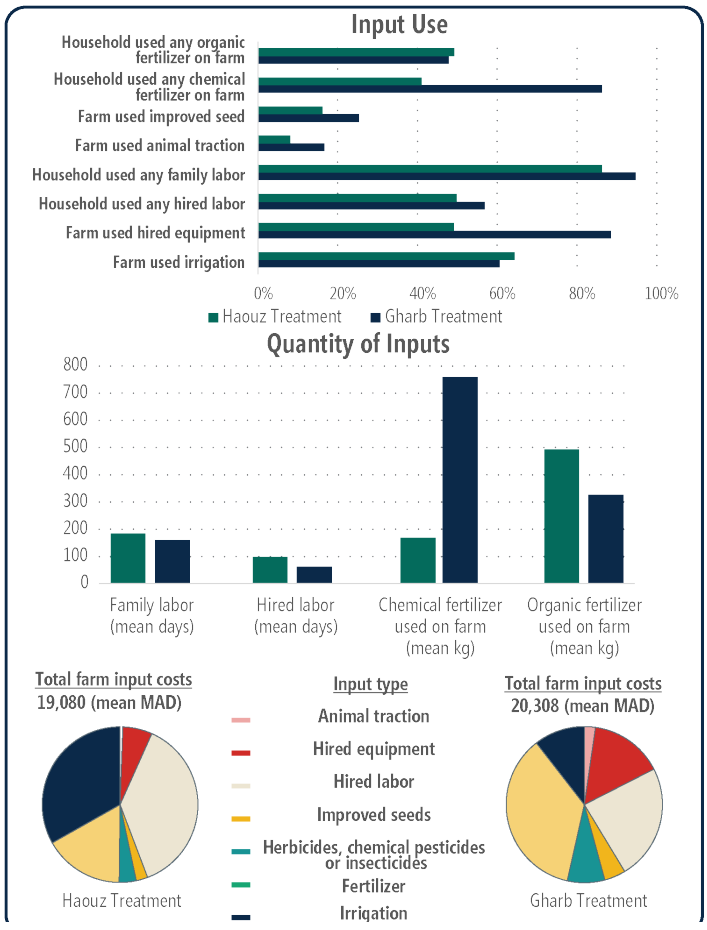
the 2016 RNA survey manual. Crop categories not shown are those with fewer than 2 percent of households cultivating and include almonds, dates, flowers, forestry, and industrial crops. We also do not show "other" crops because respondents were not asked to specify "other" crops. Percent of farm area used for each crop category is determined by first calculating the area of each parcel used for individual crops, then summing these areas for crops in the same category across all parcels, and finally dividing by the total farm area.

In addition to being more varied, agriculture in Gharb is more input intensive than in Haouz, though farmers in Haouz spend significantly more on irrigation. Figure II.6 summarizes the types of inputs used by farmers, the intensity of their use, and their overall expenditures. Gharb farmers almost all used hired equipment (89 percent) and fertilizer (86 percent) compared to less than half of Haouz households. Hired labor and improved seeds are also slightly more commonly used in Gharb (57 percent, 25 percent) than in Haouz (50 percent, 16 percent). However, despite the greater variation in input use, the average amount that households spend on agricultural inputs is similar: roughly 20,000 MAD ($2,000 USD) per household for the season. On average, farmers in Haouz spent nearly 7,000 MAD on irrigation, compared to 2,000 MAD spent by farmers in Gharb. In FGDs, farmers across stakeholder types expressed strong feelings that the high cost of irrigation constrained their decisions about the types of crops to grow. They explained the many prohibitive costs of agricultural production given their limited means. This includes setting up drip irrigation systems, digging wells, and purchasing fertilizer and other inputs. For example, on *bour* (rainfed) land in Gharb, farmers tended to grow cereal crops (wheat, barley, etc.) and legumes (beans, chickpeas, lentils), whereas on irrigated land they could grow fruits and market vegetables (melons, beets, and grapes).

"Obtaining the land title will allow farmers to access credit in order to invest and develop their agricultural activities. This will increase land value and will encourage other people to invest in the agricultural sector. And it will allow the state to collect more taxes."

—Informal buyer

Figure II.6. Agricultural input use: quantity and cost



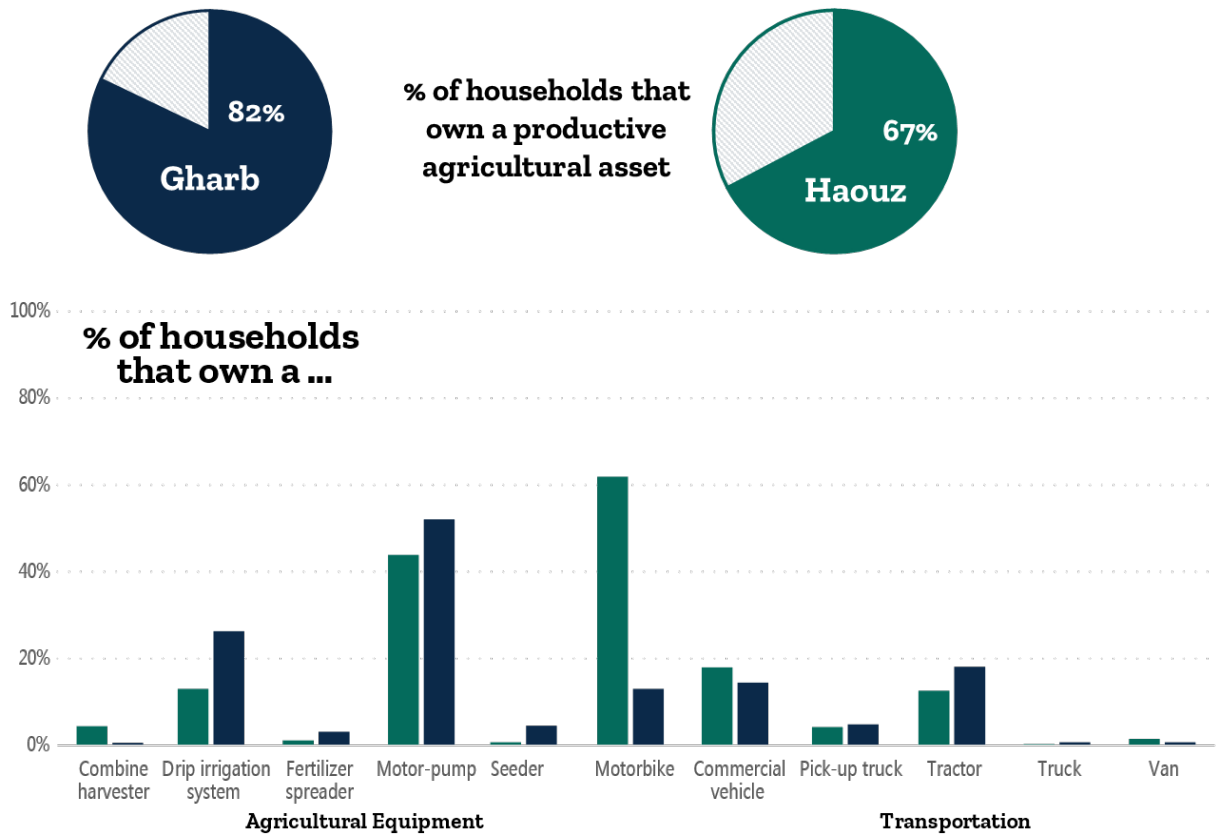
Source: Farmer survey

Note: N= 805 (813) for Haouz (Gharb). Sample sizes shown are for the largest sample, but some variables could have smaller sample sizes because of missing values. These costs are then summed for the total farm input costs. See Table C.6 for more information.

Ownership of productive assets is higher in Gharb than in Haouz, but households across both regions are interested in expanding their investments. Figure II.7 reports information on durable assets and long-term immovable assets, including

productive agricultural assets such as irrigation equipment or tractors, and vehicles (see Table C.6 for further detail). Most households in Gharb and Haouz own some kind of productive asset, though households in Gharb are more likely to report owning irrigation pumps or drip irrigation systems (52 percent and 26 percent), and tractors (18 percent), and households in Haouz are slightly less likely to own these agricultural assets: (44 percent own water pumps, 13 percent own drip irrigation systems, and 12 percent own a tractor). Households in Haouz cultivate olives, and the average number of productive trees is 380. Conditional on growing fruit trees, we also find that households in Gharb and Haouz own 63 to 95 productive trees (see annex Table C.7 for more detail). These long-term investments might increase because of greater tenure security.

Figure II.7. Long-term investment (machinery, irrigation equipment, tree-crops)



Source: Farmer survey

Note: N= 805 (813) for Haouz (Gharb). Sample sizes shown are for the largest sample, but some variables could have smaller sample sizes because of missing values. Ownership of individual assets is unconditional on owning any productive assets, defined as any of the following: tractor, seeder, fertilizer spreader, combine harvester, motor pump, seeder, commercial vehicle, motorbike, pick-up truck, tractor truck, or van.

Farmers were eager to and optimistic about making greater investments in their land after receiving titles, particularly in irrigation, crop diversification, and livestock, but financial constraints are likely to persist. Qualitative data provide greater insights into the types of investments farmers (across stakeholder types) would choose to make. Many wanted to invest in new wells (although several farmers also cited getting authorization to build a well as a constraint), drip irrigation, and solar panels, and wanted to purchase mechanized farm equipment such as tractors, combines, grinders, and seeders. They also showed interest in crop diversification, particularly to cultivate more fruits and high-value market vegetables (see **Table**

II.7 below). Several farmers expressed a desire to raise more livestock once they had *melkised* their land. However, farmers were skeptical that they would be able to access loans large enough to make those investments, and some mentioned that they would be more likely to sell their parcel. Farmers noted that credit as well as government subsidies from programs such as the Green Morocco Plan would be very beneficial (see credit access section), although only a few respondents had benefited from this program to date. Many noted that mandatory co- or joint-ownership for those with parcels smaller than 5 has might adversely affect decision-making on investments in land. Indeed, to them, this would result in a situation very similar to collective land in which decision-making related to crop choice and agricultural investment would be conflicting, just like land transaction and credit demands.

"But be logical, even if tomorrow we get our land titles, the farmers in the region do not have the money to invest and exploit their land: they will sell the land to meet their basic needs."

—Female farmer

Table II.7 Crops that farmers were interested in taking up or increasing production of

Crop category	Gharb	Haouz
Fruit trees	Oranges, olives, peaches, pear, apple, pomegranate, nectarine, avocado, banana, grapes, loquat	Olives, watermelon, banana, pomegranate, lemon
Vegetables	Artichokes, zucchini, sugar cane, beets	Potatoes, carrots, onions, beets, lettuce, peas, peppers
Legumes	Chickpeas, beans	Chickpeas, beans, lentils
Cereals	Wheat, barley	Wheat, oats
Forage crops		Alfalfa
Herbs	Coriander	Mint, parsley, coriander, cumin

Source: Focus group discussions

The logic model assumes that investment and agricultural productivity will increase as a result of a more efficient allocation of land resources; however, it is uncertain whether the overall productivity of collective agricultural land will improve through *melkisation* in cases where informal buyers are common, and/or where non-farmer heirs will reclaim the land. As described in the tenure security section above, informal buyers of collective land expressed strong concerns about losing their access to the land because of the *melkisation* procedure, in the case that heirs of deceased rightsholders reclaim that land. Many of these informal buyers had already made significant investments in the land in irrigation, labor, and other inputs; and even the prospect of *melkisation* might have had dampened their willingness to invest.

P1: Take the example of [a large farmer in this collective]: he farms 80 hectares, well-equipped with 40 employees. His land was among the best-farmed in this region. But when he discovered that his name wasn't on the rightsholders list, and then the drought happened, he reduced his efforts and his land began to degrade remarkably."

P2: "Yes, you're right. Before, when there was a drought, he would buy water cisterns to ensure the land was irrigated. But now, when he discovered he isn't on the list of rightsholders, he has basically abandoned his farm, and his land has degraded."

—Informal Buyers

Agricultural productivity

Greater productivity of formerly collective rural land is one of the two primary long-term impacts envisioned by the Rural Land Activity program logic. This is expected to be achieved through both increased investments in agricultural inputs and techniques (as described above), as well as more equitable access to and ownership of land by women and young people. A potential risk that could limit the improvement of agricultural productivity is the insufficient use of sustainable and modern agricultural techniques, combined with climatic hazards.

Table II.8. Key findings on agricultural productivity:

- **Gharb has a higher value of agricultural production than Haouz**, which could be a result of crop composition differences rather than yield differences, but it might also reflect greater climate vulnerability and drought experienced in Haouz.
- Farmers in both regions identified **lack of water and irrigation, vulnerability to weather, and drought as significant constraints on agricultural productivity.** The farmers expressed a need for agricultural training, functional literacy, and credit-related information to help address these issues.
- Although agricultural productivity might change after *melkisation* because of increased investment or efficiency-enhancing land transactions, it is unclear whether changes in agricultural productivity will be driven by a shift in crop composition towards higher-value crops, an increase in productivity for existing crops, or some combination.

At baseline, we report agricultural yields for the most commonly grown crops for Gharb and Haouz. Table II.9 reports the area dedicated to the mostly frequently cultivated crops across both regions, the yields achieved by farmers in the 2022 growing season, and the value of agricultural output. The estimates reported in II.9 provide a baseline reference point for estimating the impact of the *melkisation* both on yields for commonly grown crops and on the value of agricultural production per ha. The crops included are soft wheat, hard wheat, barley, and olives. Alfalfa was produced by nearly 20 percent of households in both regions, but we did not collect estimates on production or yield, given the challenges with measuring fodder crops in a reliable way. Crop yield was calculated by dividing the total production of each crop by a GPS-corrected measure of crop area. For the production amount of each crop, we rely on the farmers' self-reported yield, which we asked about at the farm level. We find that wheat farmers yield on average 0.8 to 1.2 tons of wheat per ha, depending on the region and variety. Barley yields are slightly more consistent, falling between 0.81 tons per ha in Haouz and 0.85 in Gharb. On average, Haouz farmers use more land for barley than Gharb farmers (0.65 ha vs. 0.45 ha). Olives are widely produced in Haouz and make up on average 2.9 ha of farm area. Olive trees yield roughly 1.8 tons per ha.

The total value of agricultural production measured per ha is greater in Gharb than Haouz, though this is more likely driven by differences in the value and composition of crops than differences in yields across crops that are grown in both regions. Across all crops, the value of production per ha in Gharb is 14,000 MAD ($1,400 USD) per ha, which is more than the value of production per ha in Haouz, where farms generate 5,000 MAD ($500 USD) per ha. Given the differences in crop composition (see **Figure II.5**) and varying production choices made by farmers, the most valuable crops may also differ across regions. In Haouz, olives and hard wheat yield the most revenue per ha, whereas dry beans are most valuable in Gharb[50].

[50] We report on the value of dry beans in Gharb only since they were grown by 25% of treatment households in Gharb but almost no households in Haouz.

The qualitative data show that farmers in Haouz in particular believed that a lack of access to water and irrigation was the primary binding constraint limiting their agricultural productivity. In nearly all the qualitative interviews conducted across both regions, farmers emphasized how vulnerable they were to the weather (particularly rainfall) when it comes to the productive use of their land. This was particularly acute in Haouz, where farmers said that the recent drought had significantly exacerbated the already dire situation and had resulted in a decline in productive yields for olives and other crops. One informal buyer in Haouz even noted that because of the drought, farmers would rather sell their land than cultivate it, but they could not find buyers.

"The absence of rain prevents any investment. If there is no water, there is nothing."

—Farmer

Table II.9. Crop yield and income per ha for commonly grown crops

Indicator	Haouz Treatment	Gharb Treatment
Area of household holdings in ag. land, corrected (ha)	6.2	4.06
Area by crop		
Area of farm used for hard wheat (ha)	1.21	0.34
Area of farm used for soft wheat (ha)	0.61	1.21
Area of farm used for barley (ha)	0.65	0.45
Area of farm used for olives (ha)	2.86	0.16
Yield by crop		
Yield of hard wheat (tons/ha)	1.19	0.84
Yield of soft wheat (tons/ha)	0.86	0.91
Yield of barley (tons/ha)	0.81	0.85
Yield of olives (tons/ha)	1.88	1.79
Household sold any crop (%)	44.4	43.9
Revenue per ha (MAD/ha)		
Production value per ha for entire farm (MAD/ha)	4,836.94	13,751.97
Production value per ha for hard wheat (MAD/ha)	6,297.9	2,955.75
Production value per ha for soft wheat (MAD/ha)	3,836.99	3,139.08
Production value per ha for barley (MAD/ha)	3,389.26	2,529.26
Production value per ha for olives (MAD/ha)	12,052.58	15,611.35
Production value per ha for dry beans (MAD/ha)		37,485.6
N	805	813

Source: Farmer survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. The area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 ha. The predicted area was then top and bottom coded at the 1st and 99th percentile. We report on the top five most frequently cultivated crops across all parcels, excluding forage crops, which are commonly cultivated but not usually sold. We also exclude "other" crops. Crops not shown where more than 100 households cultivate are: Pomegranate (Haouz), Chickpea, Sunflower, Avocado, Dry Bean (Feve Sec) (Gharb). Total production amount is calculated by top and bottom coding the self-reported values at the 99th and 1st percentile, by region and crop. Crop area is calculated using the proportion of each crop to the parcel area, and then summing these amounts across parcels. We calculate yields by dividing production amount by crop area, and then top and bottom coding non-zero values at the 5th and 95th percentile by crop. To impute crop prices, we top and bottom code self-

reported price per kilogram (for crops sold) at the 95th and 5th percentile by region and crop. If these prices are still more than twice the median across all households, we use the median price. We calculate value per ha of each crop by multiplying the imputed price of each crop times the yield times and the crop area.

"It all depends on our situation. For example, the current situation (drought) does not allow us to apply for a loan for fear of not being able to repay it. Indeed, I am able to take a loan, but I will be unable to repay it."

—Farmer

Though farmers said that small-scale irrigation might improve to a certain extent with *melkisation*, they would still face more structural issues of access to large-scale irrigation (canals, etc.) and drought, which are not being addressed by the *melkisation* project and will have an impact on productivity. Farmers were eager to access credit to make investments in small-scale irrigation systems like drip irrigation and pumps, but many worried that this would not meet their large water needs and counterbalance the added burden of the drought. For example, many noted that their wells had dried up, and that they now had to dig much deeper to find water (farmers in Haouz mentioned the need to dig wells of 150 meters to hit water, compared to 30–50 meters in the past). Digging wells is therefore both a bigger and riskier investment (one farmer in Haouz noted that it would cost 400,000 MAD on average to dig a well roughly $38,500 USD, which was not financially feasible for the average farmer). The project acknowledges these "climatic hazards"; Its work with ONCA includes facilitating access to financing from the Moroccan government for drip irrigation technology, building technical capacity for its use, and providing training on soil conservation methods to reduce greenhouse gas emissions and recommending more drought-tolerant seed varieties. In spite of this, farmers said that they would be reticent to take loans for fear of not being able to pay them back due to drought-related uncertainty.

Farmers expressed a need for the project's accompanying measures in agricultural training, functional literacy, and credit-related information, but these measures may not be sufficient to alleviate the related constraints. Several respondents explained that they could benefit from various trainings and wanted the state to invest in human capital. Most participants were eager to receive agricultural training and guidance from the state. Women in particular also identified low levels of female literacy as a problem. In addition, many were worried that young people are deciding to migrate illegally and put themselves in danger due to high levels of unemployment. Thus, while the training planned by the project will likely be welcome, it was not addressed to, and might not be enough to affect the widespread issues of unemployment and illiteracy or lead to greater productivity among experienced farmers.

Household income

Our baseline findings confirm that households in both regions (though more so in Gharb than in Haouz) derive a substantial share of income from agricultural production, validating that melkization could lead to improved household income through increased investments in agricultural productivity. One of the two ultimate impacts in the Rural Land Activity program logic (along with greater productivity of formerly collective rural land) is increased household income. This is expected to occur primarily because of the better valorization of agricultural land, the greater productivity of land, and the increased agricultural profits. However, there is a risk of exclusion for small farmers who might lose their source of income after selling the land (though they might invest the proceeds of the sale or seek work in a different sector).

Table II.10. Key findings on household incomes

- At baseline, **total income per household is similar in Gharb and Haouz** and households in both regions **derive a substantial share of income from agricultural production. Average per capita incomes in both regions are above the poverty line for rural areas in Morocco,** but households in both regions lack basic infrastructure and access to education, with a significant portion in Gharb reporting no direct connection to the piped water network.

At baseline, total annualized income per household is similar across both regions at roughly 63,000[51] MAD (6,263 USD) per household, and households in both regions derive a substantial share of income from agricultural production. Table II.11 reports income across sources, including total farm revenue, annualized sales and profits from animals, and households' wages and salaries. Households in Gharb derive 65.2 percent of household income from agricultural production, compared to 41.6 percent for households in Haouz. Households in Haouz derive a greater share of annual income from non-farm sources, reporting average wage and non-farm business incomes of 25,933 MAD (2,586 USD). Households in Gharb derive a greater share of total income from farming, though non-agricultural employment and business are an important source of income for households. We also report total farm profits and the value of output sold (our measure of production value includes own consumption, in addition to other uses for output beyond sales). We also report indicators of poverty and non-productive asset ownership that can be compared to data collected by GoM to measure poverty more broadly.

Incomes in Gharb and Haouz are on average above the poverty line for rural areas in Morocco (4,425 MAD or 492 USD per person per year[52]) and reflect other indicators of poverty in Morocco, related to basic infrastructure access and education. Per capita income across sources is 1,046 USD in Haouz and 935 USD in Gharb. This exceeds the poverty line for rural areas prepared by the High Commission of Planning (HCP). In both regions, households are lacking in some basic infrastructure and access to education: nearly 15 percent of households in both regions have no adults with a primary education, and 60 percent of households in Gharb and 16 percent of households in Haouz report having no direct household connection to piped water. Almost all households report having a connection to the electricity grid. In addition to owning productive assets (reported above), households also own a variety of durable consumer goods and vehicles, which proxy for wealth. Haouz households are more likely to own a vehicle (72 percent, often in a motorcycle) than Gharb households (30 percent). Other measures of wealth, specifically ownership of durable consumer goods and livestock, are common and similar across both regions. Very few households own a computer, though slightly more in Haouz (9 percent) than Gharb (4 percent.)

[51] HCP reports that based on data from 2019, in rural areas, the wealthiest 20 percent of the population have an average annual per capita income of 40,700 MAD and hold more than half the total income (52.3 percent), and the least wealthy 20 percent have an average annual income per capita of 4,900 MAD, and own 6.3 percent, an inter-quintile ratio of 8.3. HCP also reports that on average for rural areas, 37 percent of income comes from agriculture, 35 percent comes from salary or non-agricultural work, 14 percent comes from transfers, and 14 percent comes from other sources, including remittances (HCP 2019).

[52] We converted 2013 Moroccan poverty rate to 2021 Moroccan dirham which is the latest year for which we have the necessary GDP deflator. To convert to USD, we use the average exchange rate for 2021. The 2013 national poverty rate in Morocco is reported in the 2022 World Bank Poverty and Equity Brief for Morocco (World Bank 2022).

Table II.11. Household income sources, multi-dimensional poverty measures, and durable assets

Indicator	Haouz Treatment	Gharb Treatment
Income		
Annual household revenue across all sources (mean MAD)	60,405	65,186
Value of farm production, including own-consumption (mean MAD)	25,133	42,501
Annualized revenue from sale of animals or animal products (mean MAD)	11,655	9,394
Annualized household wages and revenue from non-agricultural household businesses (mean MAD)	25,933	14,323
Farm profit (value of farm production – costs) (mean MAD)	3,851	23,001
Value of farm sales (mean MAD)	16,955	29,651
Poverty		
Household income across sources per household member (mean MAD)	10,490	9,371
Household income across sources per household member (mean USD)	1,046	935
Household does not have grid electricity (%)	3.1	2
Household does not have a direct connection to piped water network (%)	15.9	59
Household has no adults with primary education (%)	14.8	12.6
Assets		
Household owns a vehicle (%)	71.6	30.2
Household owns a large animal (%)	60.3	68.7
Household owns a washing machine (%)	79.3	85.9
Household owns a computer (%)	9.4	3.6
N	805	813

Source: Farmer survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes owing to missing values. Household income is calculated by summing the value of farm production, animal and animal product sales, and non-agricultural businesses. Each source of income was top and bottom coded at the 99th and 1st percentile before summing. The value of farm sales has also been top and bottom coded at the 99th and 1st percentile. Profit is calculated by subtracting farm costs (which have been top and bottom coded at the 99th and 1st percentile) from the production value of the entire farm (which has also been top and bottom coded at the 99th and 1st percentile). The production value of the entire farm is calculated by summing the production value of each crop on the farm. The production value of each crop is calculated by multiplying the imputed price per crop times the crop yield times and the crop area. To impute crop prices, we top and bottom code self-reported price per kilogram (for crops sold) at the 95th and 5th percentile by region and crop. If these prices are still more twice the median across all households, we use the median price. Crop area is calculated using the proportion of each crop to the parcel area, and then summing these amounts across parcels. We calculate yields by dividing production amount by crop area, and then top and bottom coding non-zero values at the 5th and 95th percentile by crop. Productive agricultural assets are reported in Figure II.4 above. Other assets that more than 95% of households report having are not reported in the table: television, refrigerator, cell phone, and antenna.

C. Analysis of cross-cutting outcomes at baseline

The program logic includes two important cross-cutting themes: Gender and social inclusion (GSI) and environmental and social protection (ESP). In this section, we discuss our analysis of GSI. Discussion of the role of ESP is included in the previous section on baseline outcomes, including in our discussion of the constraints to agricultural investment and agricultural productivity.

Gender and social inclusion

One of the medium-term outcomes of the Rural Land Activity program logic is more equitable access and ownership by women and young people to land property. Both groups are expected to achieve this, strengthening their capacities (in functional literacy, knowledge of land rights, and agricultural practices) through accompanying measures, and by receiving titles to *melk* land. A risk to achieving these outcomes for women is that, though recent laws put in place offer increased opportunities to formalize women's access to land, without sufficient shifts in knowledge, attitudes, and practices, women may have limited ability to maximize the benefits of their title.

Table II.12 Key findings on Gender and Social Inclusion:

- The Gender and Social Inclusion Plan developed as part of the compact (MCA-M 2018) identified **that women face primary binding constraints regarding their land rights in rural collective land**, including a lack of information and awareness, limited knowledge, and access to institutions and services.
- **Productive agricultural assets, including land, are almost entirely owned, and controlled by men,** and women do not control or make decisions regarding these assets. Fewer than 10 percent of women report having the right to sell or be named as an owner on a legal document related to the target parcel.
- **Women's perceptions of their own land rights and decision-making about land are limited.** However, there is greater involvement of women in inheritance decisions, with 15 to 25 percent of principal respondents acknowledging their spouse's contributions to these decisions, and a large majority acknowledging the rights of wives and daughters to inherit collective land.
- **Recent laws passed in 2019 improved women's collective land rights,** including *Dahir* 62.17, which explicitly stated that women are entitled to benefit from the proceeds of collective lands, and *Dahir 64.*17 **which removed the single-heir provision on collective land**, enabling many women to formalize their right to inherit land.

The GSI Plan developed as part of the compact (MCA-M 2018) provides more detail on the primary binding constraints faced by women with respect to rural collective land, including a lack of information and awareness regarding their land rights, as well as limited knowledge and access to institutions and services such as agricultural extension, which might prevent women from taking full advantage of the benefits associated with *melkisation*.

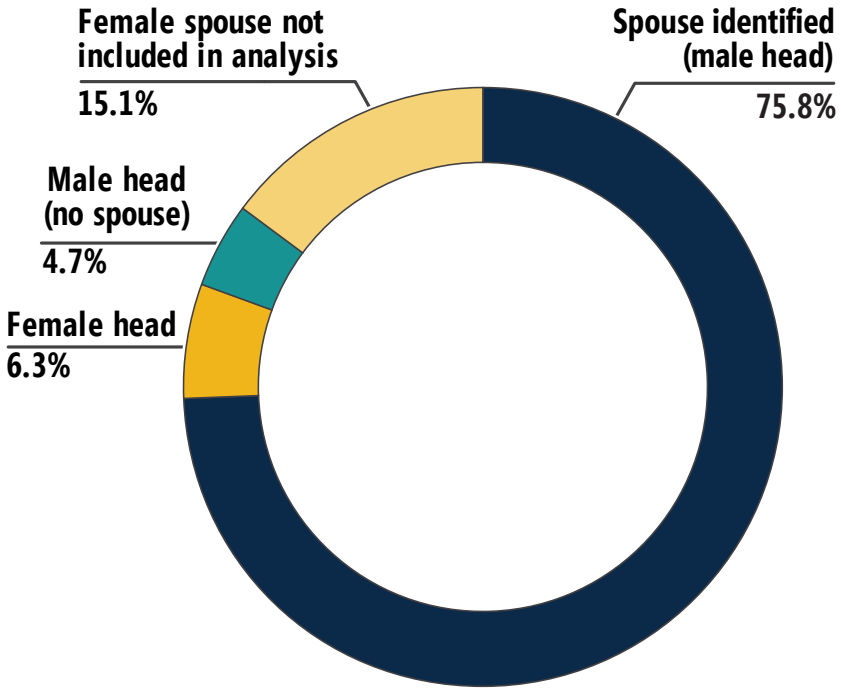
In this section, we report on perceptions of spouse respondents regarding their agency in the household, including decision-making power over assets, land, and agricultural activities. Our gender analysis focuses on intra-household dynamics and therefore excludes the small share of female owners who responded to the main survey as household heads. Limiting the gender analysis in this way allows us to compare intra-household dynamics across households with similar structures. **Figure II.8** summarizes the sample included in our gender analysis (see annex Table C.8 for further details).

At baseline, we find that productive agricultural assets are almost entirely owned and controlled by men. In **Table II.13**, we report information on women's empowerment, based on questions adapted from International Food Policy Research Institute's (IFPRI) Women's Empowerment in Agriculture Index (WEAI). To reduce respondent burden and prioritize indicators related to the program logic, our survey focuses on two of the five WEAI domains[53]: production and resources. However, we pose these questions to both the main respondent and the spouse, which allows us to capture self-reported perspectives across men and women. Although nearly 25 percent of female spouses report working on the family farm, women do not control or make decisions about productive agricultural assets. We find that household

[53] WEIA measures the degree of women's decision-making power regarding 5 domains of agricultural activities: agricultural production, resources, income, leadership, and time. Questions are weighted such that all five domains contribute equally to the household's "empowerment score."

assets, especially productive assets, are almost entirely owned by men in the household. Between 64 and 74 percent of (male) principal respondents report owning or co-owning a productive asset (including machinery, vehicles, or irrigation system) whereas less than 4 percent of female spouses report owning or co-owning these types of assets. One exception involves small animals. In 58 to 82 percent of households, depending on the region and the respondent, especially in Gharb, the female spouse is the sole owner of chickens, rabbits, and bees.

Figure II.8. Composition of sample by gender and marital status



Source: Farmer survey and spouse survey

Note: N= 1617. Female head includes those with and without a spouse. We do not include a female spouse in the analysis for the following reasons: (1) the spouse survey was not conducted owing to refusal or because the spouse was not available, and (2) in limited cases, data quality issues prevent us from correctly matching the principal respondent with the spouse.

Table II.13. Adapted WEAI ownership index disaggregated by gender (spouse/main respondent)

Indicator	Haouz Treatment		Gharb Treatment	
	Main respondent	Spouse respondent	Main respondent	Spouse respondent
Worked on the family farm (%)	78.1	25.2	92.3	26.7
Worked in a non-agricultural business belonging to the household (%)	17.7	2.4	9.2	0.2
Sole owner of any productive assets (%)	77.4	4.4	66.9	2.4
Sole owner of small animals (%)	15	67.1	11.1	82.2
Decision maker on vehicles purchase/sale/transfer (%)	84.7	4	86	2.8
Decision maker on machinery purchase/sale/transfer (%)	96.5	2	96.8	7.3
Decision-maker on irrigation purchase/sale/transfer (%)	97.6	3.3	98	4.7
N	562	562	663	663

Source: Farmer survey and spouse survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes owing to missing values. This table reflects answers provided by a sub-sample of main respondent (male only) and spouse respondents (female only). In order to compare intra-household dynamics among households with similar structures, we exclude households with a female head. The columns "Main respondent" and "Spouse respondents" show each respondent's answers. Productive agricultural assets are reported in III.4 above. Small animals are defined as any of the following: poultry, rabbits, or bees.

In addition to controlling productive assets, men typically own and control land, while women are excluded from most decision-making on land, except for decisions about inheritance. Table II.13 reports on the main respondent's and the spouse respondent's perceptions of their own land rights and decision-making regarding land. Fewer than 10 percent of women report either having the right to sell the target parcel or being named as an owner on a legal document (both measures relate to the SDG land indicators). Despite the low rates of documented joint-ownership, spouses are not concerned about losing their right to use the target parcel. However, women more frequently report that they have the right to bequeath the target parcel (18 percent in Haouz and 21 percent in Gharb). This perceived right to bequeath land is also reflected in whether the spouse feels she can make decisions or has input into inheritance decisions. We find that 15 percent of principal respondents in Haouz and 25 percent of respondents in Gharb acknowledge that their spouse contributes to decisions regarding land inheritance, and a large majority acknowledge the rights of wives and daughters to inherit collective land (see annex Table C.9). Spouses are even more likely to report that they are involved in inheritance decisions, with 28 percent of spouses in Haouz and 43 percent of spouses in Gharb reporting that they are involved.

"Before, a woman did not dare to claim her right to inheritance (especially that of her father). Now, it is possible to appeal to the court."

—Female farmer

Qualitative and monitoring data reflect mixed findings about women's decision-making power related to inheritance. FGDs with male farmers seemed to suggest that female inheritance was now a commonplace practice (though there were disagreements and contradictory statements among men). This is also documented in the Land Productivity Project indicators, which shows that 23,809 heirs of rightsholders are expected to receive titles (titles that will be shared between male and female heirs in line with the new laws). However, among women, the impression of progress was far more nuanced, and many still felt very much at a disadvantage compared to their male counterparts. Some women felt that they now had legal recourse to support their inheritance rights. Others, however, explained feeling coerced, pressured or incentivized to forgo signing up on the rightsholders list, or to sell or give away their parcels once they gained title. There was some concern that once women gain land titles, that land would effectively be lost to the ethnic collective if the woman were to marry an outsider (due to the requirement of residency to determine membership in a collective, and the typical practice in Morocco that when women marry an outsider they leave the collective to reside in the collective of her husband).

"People are afraid that the ownership of the land will pass to someone outside the ethnic community if their daughters marry. People overlook the likelihood that women may also have the opportunity to work on a project and that they need their land for that."

—Nayb

Table II.14. Women's land rights and decision-making within the household

Indicator	Haouz Treatment		Gharb Treatment	
	Main respondent	Spouse respondent	Main respondent	Spouse respondent
Owner of the target parcel (%)		4.1		4.6
Is named on the document showing the right to use the target parcel (%)	96.5	6.6	91	9.5
Has the right to sell the target parcel (%)	98.9	4.9	99	8.6
Has the right to bequeath the target parcel (%)	98.7	18	98.7	21.1
Decision-maker on target parcel inheritance (%)	34.8	28.1	53.9	43.3
Decision maker on target parcel trans., collat., or inheritance (%)	98.6	30.9	98.4	43.5
Has input into target parcel trans., collateral, or inheritance (%)	97.7	49	95.5	45.6
Probability of losing right to use TP in 5 years (1 = Not at all; 5 = Extremely)	1.06	1.08	1.24	1.19
Consulted for any loan decisions (%)	86.7	0	88.5	8.6
Female spouse can hypothetically inherit target parcel (%)	90.4	88.5	85.2	80.4
Daughter can hypothetically inherit target parcel (%)	86.2	87.2	91.2	84.9
N	562	562	663	663

Source: Farmer survey and spouse survey

Note: Sample sizes shown are for the largest sample, but some variables might have smaller sample sizes owing to missing values. This table reflects answers provided by both the male main respondent and the female spouse respondent. The columns "Main respondent" and "Spouse respondents" show each respondent's answers about themselves. Forms of documentation showing the right to use the target parcel are reported in Figure II.2.

"For us, women have always had their rights in the inheritance of their fathers unless their brothers refused or ceded it to them voluntarily."

—Male farmer

"It depends on the degree of 'kindness and generosity' of the brothers. If they have good hearts, they also bequeath to their sisters. Otherwise, they take it all."

—Female farmer

Largely because of the recent passage of new laws governing land rights in 2019, women's land tenure security may improve through *melkisation* in cases where they are included on the list of rightsholders or where they obtained inheritance acts, but persistent gender norms will likely continue to impede these benefits. Article 8 of the 1969 *dahir* governing collective land in irrigated perimeters required that a single heir or anonymous "group of heirs" be designated (typically male according to customary practice, although in some cases women inherited land), and effectively limited use rights to males by specifying that their principal beneficiaries are heads of household. However, the recent passage of *dahir* 64.17 in 2019 removed this single-heir provision. As a result, inheritance of collective land now aligns with Morocco's 2004 Family Code which applies Sharia law, in which women are entitled to half the shares of land that men received. Similarly, *dahir* 62.17 (also in 2019) explicitly stated for the first time that women are entitled to benefit from the proceeds of collective lands. Despite these legal gains, qualitative interviews suggested that historical customary practices regarding gender and inheritance might still be followed in some collectives, and that social stigma may still prevent some women from claiming their rights in the future.

D. Statistical balance and validation of impact evaluation design

In this sub-section, we report on the statistical balance across the treatment and comparison groups along selected characteristics that are either fixed characteristics or fixed relative to the timing of the baseline data collection and *melkisation* program. We then implement a propensity score model, which we use to create a matched comparison group that improves the balance between the treatment and control group, and which will be used to estimate impacts[54] following the endline survey. As discussed in the evaluation overview, a matched comparison group design is our preferred[55] approach. For an overview of matching methods, see Rosenbaum and Rubin (1983), Heckman et al. (1998), Stuart (2010), and King and Nielsen (2019). In addition to reporting on the matched comparison group design, we also analyze the validity of the spatial RD model and report on statistical balance to validate the proposed impact evaluation design (reported in **Annex D**).

Statistical balance across the full sample and matching

Our propensity score model includes variables that are related to treatment or that may influence outcomes of interest, such as household income or existing holdings of productive assets, and characteristics that are relatively fixed, such as household demographics. However, since the *melkisation* procedure already started at the time of baseline data collection, we exclude any variables that might have been affected by the prospect or process[56] of *melkisation*. These include indicators such as perceptions of tenure security, applications for credit, and reports of conflict. We include the selected variables in a model that predicts the likelihood that a unit is treated (its propensity score; see Rosenbaum and Rubin 1983 for details). The propensity score is estimated using a logit model of treatment assignment on the list of selected variables. We then compare the distribution of predicted probabilities for the treatment and control group to assess whether there are sufficient comparable[57] units where the propensity scores are close enough between treated and control units. Finally, we match treatment observations to the five nearest control group units, with replacement. We conduct and report separate analyses of balance for Gharb and Haouz, since we plan to estimate impacts separately for both regions separately. **Table II.15** lists the variables that are included in our propensity score model.

[54] Note that because we are interested in whether we can find suitable matches from our comparison group, we do not use the survey weights in this analysis. Subsequent analysis at endline would incorporate survey weights to adjust our estimates of the treatment effect of melkisation.

[55] The matched comparison group design has the advantage that it provides impact estimates for the entire treated area and uses information from the full data set. The spatial RD approach, while valid, would estimate treatment effects for a smaller subset of observations located near to the boundary of treated collectives rather than for the full treated sample. The spatial RD approach is also vulnerable to the risk that the Government of Morocco may choose to *melkise* control collectives, thereby effectively contaminating the control group.

[56] At the time of baseline data collection, people in the treatment group knew they would be receiving a title in the future and might have adapted their behavior as a result. Similarly, early steps in the process of melkisation, such as the development of the list of rights holders or the household and parcel survey, might have affected key outcomes, for example, by clarifying ownership rights, resolving (or creating) conflict, or establishing lists of rightsholders.

[57] The extent of overlap in propensity scores is often referred to as the *common support.* In some applications, there might be no control group units with propensity scores close enough to the treated group, and the treated units have to be dropped from the analysis. We found that distribution of propensity scores is generally overlapping, so we choose not to exclude treatment units.

To assess the balance of our sample and to give a sense of the magnitude of any differences between the groups, we first report estimates of the difference in means between the treatment and control group. However, to assess the performance of our matching process and to present a measure of the improvement in balance, we report the standardized mean difference between treatment and control. We calculate by dividing the difference in means by the square root of the average variance. We consider variables with a standardized difference in means between -0.1 and 0.1 to be balanced after matching (see Normand et al. (2001) and Stuart et al. (2013) for further details).

Table II.15. Variables used in propensity score model and to assess balance

Indicator
Household head's age
Household head is female
Household head is married
Number of household members
Number of children 18 or younger in household
Household head worked on the family farm
Household owns a productive agricultural asset
Household owns a drip irrigation system
Household owns a tractor
Total income across sources
Household does not have grid electricity
Household does not have a direct connection to piped water network
Asset index quintile
Household owns a large animal
Household owns cattle

Balance in Gharb sample

Table II.16 reports the difference in means between treated and control households and tests for whether the difference is statistically significant. At baseline, households in the treatment and control group have similar demographic characteristics. However, we see statistically significant differences across the two groups in a few important dimensions. Treated households have larger target parcels and larger overall landholdings. Treated households are also wealthier based on the measures included: they have greater asset holdings, including higher asset index scores, are more likely to own productive agricultural assets, and report higher total income.

Using the results of our propensity score model, we find propensity scores for the treatment group ranging from 0.17 to 0.99, and for the control group, from 0.14 to 0.99. The overall range of propensity scores is largely overlapping, so we choose not to drop treated units from the common support. The distributions of propensity scores for the treatment and control group are shown in **Figure II.9**. Although there is shift in the propensity score distribution towards zero for the control group, the overlap between the treatment and control group is large, and the two groups share a common support.

Table II.16. Statistical balance before matching in Gharb for selected outcomes

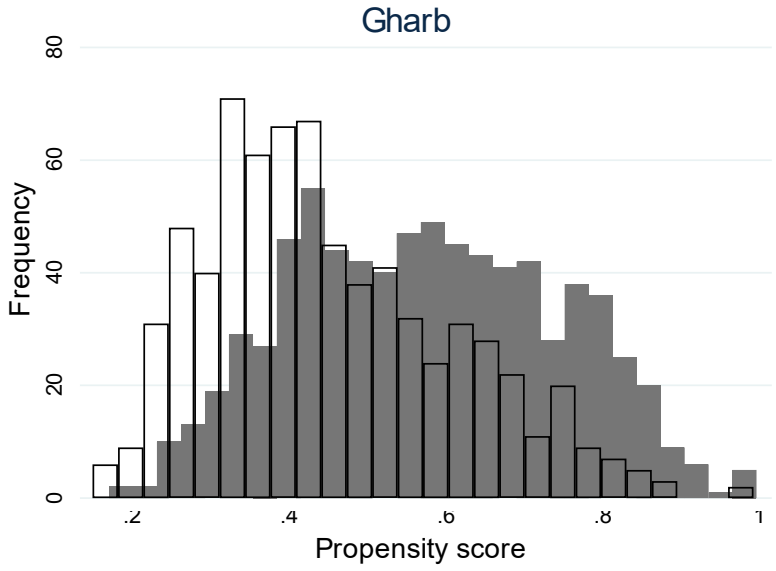
Indicator	Gharb treatment	Gharb control	Diff.	P-value	P-star
Household head's age (mean)	59.54	59.02	0.52	0.4844	
Household head is female (%)	5.6	5.3	0.3	0.8152	
Household head is married (%)	90.1	88.9	1.2	0.5148	
Number of household members (mean)	7.06	7.16	-0.11	0.6125	
Number of children 18 or younger in household (mean)	2.22	2.15	0.08	0.5326	
Household head worked on the family farm (%)	90.2	90.5	-0.3	0.8492	
Household owns a productive agricultural asset (%)	67.3	59.5	7.8	0.0048	***
Household owns a drip irrigation system (%)	26.3	11.3	15	0	***
Household owns a tractor (%)	18.1	15.6	2.6	0.2356	
Household income across sources (mean MAD)	65,064.3	66,648.18	-1,583.88	0.8305	
Household does not have grid electricity (%)	2	1.1	0.9	0.1915	
Household does not have a direct connection to piped water network (%)	59	59.5	-0.5	0.8578	
Asset index quintile (mean)	3.14	2.98	0.16	0.052	*
Household owns a large animal (%)	68.7	70.3	-1.7	0.5318	
Household owns cattle (%)	51.5	57	-5.5	0.0564	*
N	813	783			

Source: Farmer survey

Note: The area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 ha. The predicted area was then top and bottom coded at the 1st and 99th percentile. Household income is calculated by summing the value of farm production, animal and animal product sales, and non-agricultural businesses. Each source of income was top and bottom coded at the 99th and 1st percentile before summing. Asset index was calculated using a principal component analysis of all asset types owned by the household. Productive agricultural assets are reported in Figure III.4 above. Large animals are defined as any of the following: cattle, sheep, goats, horses, camels.

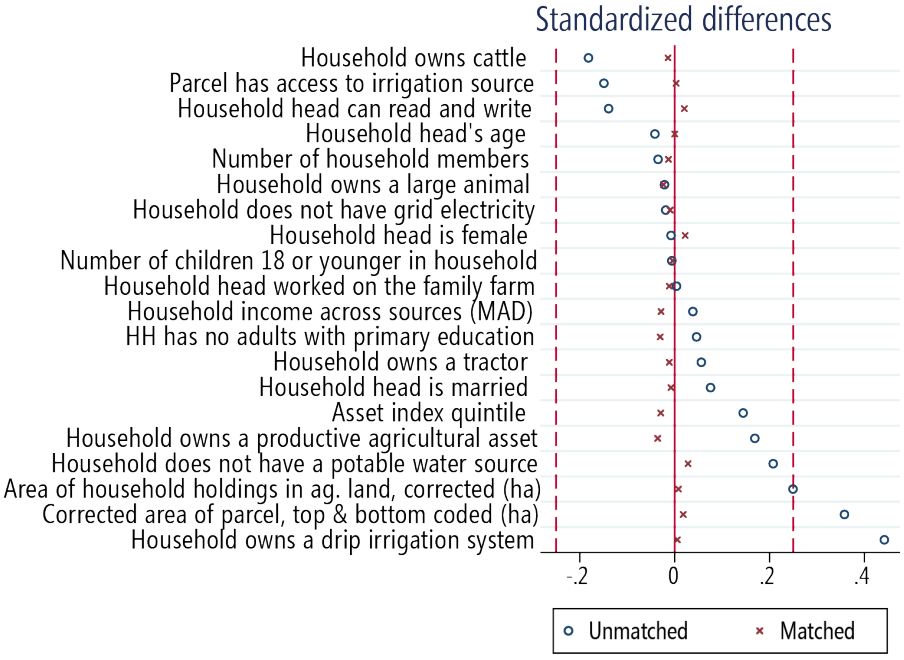
Stars indicate whether the difference is statistically different from zero, with *** = 1% significance, ** = 5% significance, and * = 10% significance.

Figure II.9. Propensity scores for treated and control units in Gharb



In **Figure II.10**, we show the standardized mean difference for the set of variables for which we report balance before and after matching. Treated units are matched to the five control units with the closest propensity scores. Variables are listed in descending order of the unmatched difference, leading with variables for which the control group value is higher than the treatment group value. Based on a threshold value of plus or minus 0.25, we find three variables that are unbalanced in the unmatched sample: total land holdings, area of the target parcel, and share of household owning a drip irrigation system. Following matching, the statistical balance across all variables is improved, and we can achieve a balanced sample.

Figure II.10 Balance across selected variables for treatment and control in Gharb, before and after matching



Balance in Haouz sample

Table II.17 reports the difference in means between treated and control households and tests for whether the difference is statistically significant. At baseline, households in the treatment and control group have similar demographic characteristics, except that treated households are (1) less likely to be married, and (2) have fewer children. Treated households are also wealthier along some of the dimensions. However, we see statistically significant differences across the two groups in a few important dimensions. Treated households have larger target parcels and larger overall landholdings. Treated households also appear wealthier: they have greater asset holdings, including higher asset index scores, are more likely to own productive agricultural assets, and report higher total income.

Using the results of our propensity score model, we find propensity scores for the treatment group ranging from 0.17 to 0.99 and for the control group from 0.14 to 0.99. The distributions of propensity scores for the treatment and control group are shown in **Figure II.11**. Although there is shift in the propensity score distribution towards zero for the control group, the overlap between the treatment and control group is large, and the two groups share a common support.

Table II.17. Statistical balance before matching in Haouz for selected outcomes

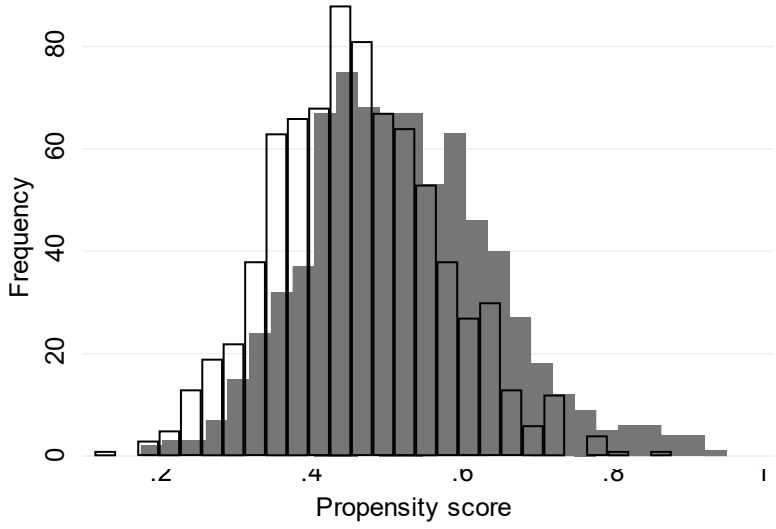
Indicator	Haouz treatment	Haouz control	Diff.	*P*-value	*P*-star
Household head's age (mean)	59.1	58.57	0.52	0.4663	
Household head is female (%)	3.7	2.8	0.9	0.3026	
Household head is married (%)	91.3	93.6	-2.2	0.095	*
Number of household members (mean)	6.74	6.8	-0.06	0.7745	
Number of children 18 or younger in household (mean)	2.42	2.69	-0.26	0.0254	**
Household head worked on the family farm (%)	74.7	73.6	1.1	0.6291	
Household owns a productive agricultural asset (%)	82.1	75.6	6.4	0.0023	***
Household owns a drip irrigation system (%)	13	8.5	4.6	0.0024	***
Household owns a tractor (%)	12.6	14.9	-2.3	0.201	
Household income across sources (MAD)	60,082	62,339	-2,256	0.6433	
Household does not have grid electricity (%)	3.1	0.7	2.4	0.0001	***
Household does not have a direct connection to piped water network (%)	15.9	9.1	6.8	0.0001	***
Asset index quintile (mean)	3.03	2.87	0.16	0.0392	**
Household owns a large animal (%)	60.3	53.9	6.4	0.0133	**
Household owns cattle (%)	31.4	24	7.4	0.0013	***
N	805	811			

Source: Farmer survey

Note: The area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 ha. The predicted area was then top and bottom coded at the 1st and 99th percentile. Household income is calculated by summing the value of farm production, animal and animal product sales, and non-agricultural businesses. Each source of income was top and bottom coded at the 99th and 1st percentile before summing. Asset index was calculated using a principal component analysis of all asset types owned by the household. Productive agricultural assets are reported in Figure III.4 above. Large animals are defined as any of the following: cattle, sheep, goats, horses, camels.

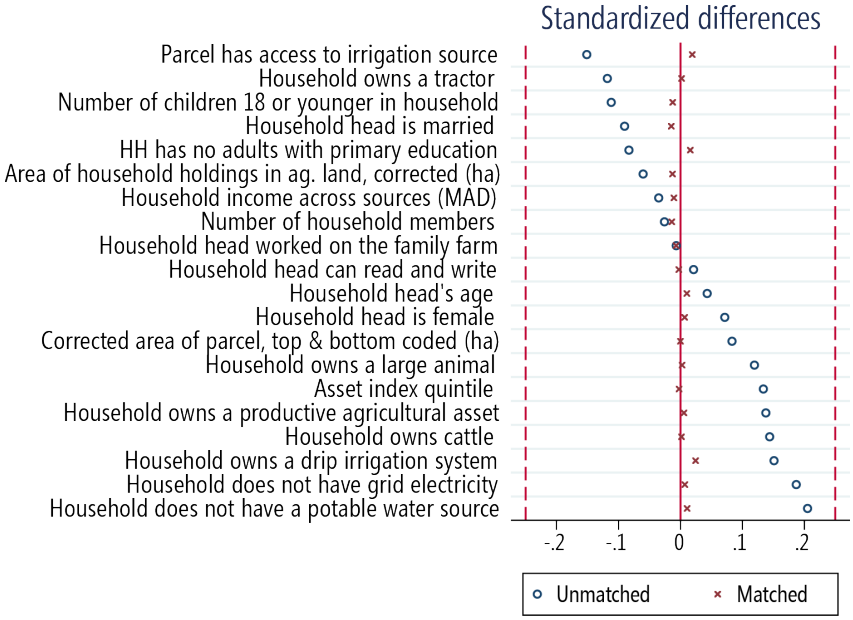
Stars indicate whether the difference is statistically different from zero, with *** = 1% significance, ** = 5% significance, and * = 10% significance.

Figure II.11. Propensity scores for treated and control units in Haouz



In Figure **II.12**, we show the standardized mean difference for the set of variables for which we report balance. Based on a threshold value of plus or minus 0.25, we find three variables that are unbalanced at baseline: total land holdings, area of the target parcel, and whether the household owns a drip irrigation system. Variables with circles that lie to the right of the line at zero are the variables where treated averages are greater than control averages. Following matching, we can achieve a balanced sample.

Figure II.12 Balance across selected variables for treatment and control in Haouz, before and after matching



E. Validation of key outcomes against existing data sources

Our study relies on the assumption that the data collected during the farmer and spouse survey are accurate and representative. However, key outcomes such as land area, crop yields, and income are prone to measurement error, especially when self-reported[58]. For example, respondent bias, misinformation, or data entry errors can lead respondents or surveyors to report inaccurate information. In this sub-section, we compare our findings on two key outcomes—crop yields, and income and poverty—to existing data sources to validate the measures. We also aim to understand the extent to which our findings differ from other rural areas in Morocco or the national average, where available. We report on crop yields, and income and poverty because they are either indirectly or directly tied to the project's goal of improving land productivity and farmer wellbeing (we provide additional analysis of land area and property rights in Annex E).

[58] See Prydz et al. 2022 for a discussion of the sources of bias in survey-based measures of income and consumption. See Gourlay et al. 2019 for a discussion of bias in area measurement and the implications for measuring yields.

Yield

Agricultural output per hectare is a crucial metric for productivity but in recent years the accuracy of both farmer self-reported estimates of output and land area[59] has been questioned. New more costly or data-intensive measurement techniques have been proposed, including crop cuts, GPS-based land measurement or remote-sensing methods (Kosmowski et. al. 2021). Yields are often mis-estimated due to problems with self-reported data, and since yields rely on the accuracy of output (numerator) and area (denominator), both of which can be measured with error, it is important to validate our metrics[60] by comparing them to external sources.

Table II.18. Survey based yield measures for selected crops by region and irrigation access compared to external data sources

		Farmer Survey				External data[a]
		Haouz		Gharb		Morocco
Crop	Statistic	No Irrigation Access	Irrigation Access	No Irrigation Access	Irrigation Access	Yield range
Hard wheat	Median (tons/ha)	0	0.63	0.13	0.73	
	Mean (tons/ha)	0.24	1.61	0.52	1.36	0.88– 2.65
	N	63	210	71	48	
Soft wheat	Median (tons/ha)	0	0.51	0.12	1.27	
	Mean (tons/ha)	0.05	1.34	0.42	1.7	0.91– 2.64
	N	56	110	197	155	
Barley	Median (tons/ha)	0	0.06	0.39	0.8	
	Mean (tons/ha)	0.34	1.08	0.75	0.96	0.46 – 1.86
	N	34	112	90	48	
Olives	Median (tons/ha)	0	0.81			
	Mean (tons/ha)	1.28	2.15			1.2 – 2.7
	N	48	638			

Source: Farmer survey, Moroccan Ministry of Agriculture (reported in USDA 2022) and International Olive Council, 2019

Note: The area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 ha. The predicted area was then top and bottom coded at the 1st and 99th percentile. Total production amount is calculated by top and bottom coding the self-reported values at the 99th and 1st percentile, by region and crop. Crop area is calculated using the proportion of each crop to the parcel area, and then summing these amounts across parcels. We calculate yields by dividing production amount by crop area, and then top and bottom coding non-zero values at the 5th and 95th percentile by crop.

[a] We report the range of annual yields for wheat and barley between 2019 and 2022 using data from the Ministry of Agriculture (USDA 2022) and the range of annual yields for olives reported for the period 2009 to 2019 (Olive Council 2019).

[59] While it is logistically easier to collect self-reported data on land area, farmers often under- or over-estimate the parcel size, especially for very small or large parcels respectively. Additionally, respondents often round parcel sizes, which can also lead to inaccurate information. See Annex A for a description of how we account for these potential errors, and how the self-reported parcel sizes compare to the GIS-based parcel area measurements based on the RNA and NST data.

[60] Our survey estimates crop yields at the farm-level. Farmers were asked to report how much of each crop they harvested at the level of the farm. In contrast, land area dedicated to growing each crop was reported by parcel. To calculate yields, we use the total output variable reported by farmers and the sum of the area across all parcels growing the crop. We account for inter-cropping and mixed parcels by asking the farmer to estimate the share of their land dedicated to the crop and adjust our measure of area accordingly.

For cereal crops, we compare the mean yields from our data for hard wheat, soft wheat, and barley to the yield estimates reported by the Moroccan Ministry of Agriculture (**Table II.18**). From 2019 to 2022, the Moroccan MoA reported that annual wheat yields (for hard and soft wheat) ranged from 0.9 t/ha and 2.64 t/ha, and barley yields ranged from 0.46 t/ha to 1.86 t/ha, with the lowest yields for both crops occurring in 2022 (USDA, 2022). Our estimates, collected in the 2022 agricultural season, fall towards the lower end of the yield range for all three crops. Given the severe drought in the 2022 agricultural season, it is not surprising that we estimate lower yields than previous years. For olives, which are grown extensively in Haouz, we compare our estimates of yields to those from industry reports. A recent report on Moroccan olive cultivation from the International Olive Council reports that from 2009 to 2019, yields for the country ranging from 1.2 t/h to 2.0 t/h for rainfed fields and 1.4 t/ha to 2.7 t/ha for fields with access to irrigation. (International Olive Council, 2019) Our estimates are 1.3 t/h for crops with no access to irrigation and 2.2 t/h for crops with access to irrigation.

Income and poverty

The *melkisation* program aims to increase household incomes by facilitating long-term investment, improving crop yields, and raising production value. We validate our income metrics by comparing income, asset ownership, and poverty rates with similar information from the Moroccan government's High Commission of Planning (HCP) and the World Bank. Our measure of household income is calculated by summing farm production value with revenue from animal sales, household wages and salaries, and non-agricultural household business. Using these income measures, we estimate the percentage of our sample living in poverty according to the World Bank's 2020 national poverty line (4,789 MAD or 533 USD per person per year in urban areas and 4,425 MAD or 492 USD per person per year in rural areas)[61].

We compare our estimates to HCP reports in **Table II.19**. HCP reports that annual household income in rural areas in Morocco in 2019 was 77,600 MAD (7,739 USD)[62] whereas our findings are lower, at roughly 63,000 MAD (6,263 USD). The lower average incomes of our sample are reflected in higher poverty rates for our sample. While the World Bank estimated that in 2013 4.8% of Moroccans were living below the national poverty line, we find a much higher proportion of poor households in our sample our sample (roughly half). We also note that our survey was designed to capture sources of income that we believed were important for households or that were directly related to agricultural incomes—we do not capture all income sources, including remittances and government transfers, which HCP notes are important sources of income in rural areas. To this end, we also compare asset ownership across HCP data and our farmer survey. HCP reported that in 2019 among rural households, 7.6% owned a car, 89.2% owned a refrigerator, and 41% owned a washing machine. We find higher rates of all three measures in both regions. In some cases, these discrepancies may be the result of variation in how survey questions are phrased. For example, our definition for vehicle ownership includes motorbikes, trucks, vans, or commercial vehicles whereas the HCP only reports "cars".

[61] We converted the 2013 Moroccan poverty rate to 2021 Moroccan dirham which is the latest year for which we have the necessary GDP deflator. To convert to USD, we use the average exchange rate for 2021. The 2013 national poverty rate in Morocco is reported in the 2022 World Bank Poverty and Equity Brief for Morocco and is based on data collected by HCP. https://databankfiles.worldbank.org/public/ddpext_download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_MAR.pdf

[62] See 2019 HCP Revenus des ménages - Niveaux, sources et distribution sociale (https://www.hcp.ma/Revenus-des-menages-Niveaux-sources-et-distribution-sociale_a2697.html)

Table II.19. Survey based measures of income and assets compared to external sources

	Farmer Survey				HCP
	Haouz Treatment		Gharb Treatment		Rural
Indicator	Median	Mean	Median	Mean	Mean
Household revenue across sources (MAD)	33,450	60,405	31,740	65,186	77,600
Household revenue across sources (USD)	3,336	6,024	3,166	6,501	
Household revenue across sources per household member (MAD)	5,506	10,489	4,517	9,371	15,560
Household revenue across sources per household member (USD)	549	1,046	450	934	
Asset ownership					
Household owns a vehicle (%)		70		30	7.6
Household owns a refrigerator (%)		98		98	89.2
Household owns a washing machine (%)		79		84	41
Poverty					
Household is below the national urban poverty line (%)		45		52	
Household is below the national rural poverty line (%)		43		49	
N	805	805	813	813	

Source: Farmer Survey and HCP

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. Sample includes treated households in Gharb and Haouz. Household income is calculated by summing the value of farm production, animal and animal product sales, and non-agricultural businesses. Each source of income was top and bottom coded at the 99th and 1st percentile before summing. HCP estimates on household income come from the 2019 *Revenus des ménages - Niveaux, sources et distribution sociale*. HCP estimates on asset ownership are from the 2019 HCP *Enquête Nationale sur l'Emploi*. Both HCP samples are for rural areas.

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III. Industrial Land Activity Baseline Evaluation

In this section we report on our qualitative and descriptive analyses of outcomes as well an analysis of quantitative data from baseline. We use insights from key informant interviews to present stakeholder perspectives on the baseline outcomes associated with the Industrial Land Activity. As appropriate, we complement these qualitative insights with findings from analyses of remotely sensed data (to identify baseline built-up surface area and economic activity) and administrative zone-level statistics (to shed on land-use patterns). Each subsection below broadly corresponds to one or more outcomes of the Industrial Land Activity, as highlighted in the activity logic (MCA-M and MCC 2022).

Table III.1. Key findings on Industrial Land Activity

- Insights from KIIs confirm MCC's earlier understanding that the industrial land sector is dominated by a strong presence of the State in the conception and development of industrial zones.
- They also confirm that restrictive laws and onerous procedures associated with identifying, acquiring, and developing land inhibit industrial zone development in Morocco.
- Inconsistencies in the quality of management across industrial zones persist, and there is particularly high demand for improving the provision of zone-level infrastructure and services.
- The share of industrial lots that have been leased/sold at baseline is high. However, many of these have either not been developed or are used for unproductive purposes (such as storage).
- Economic activity (as proxied by nighttime luminosity) in the demonstration zones appears to be trending positively, suggestive of higher growth and job creation. Subsequent rounds of geospatial data collection have the potential to further highlight increases in zone-level built-up area and economic activity associated with compact-supported activities.

A. Analysis of key outcomes at baseline

Efficient, transparent, and equitable process of IZ development/revitalization

The Industrial Land Activity aims to transform the approach by which IZs are brought to market through a new demand-driven model for industrial zones by fostering more efficient, transparent and equitable processes of zone development, revitalization and management. This is expected to be achieved by providing technical assistance for the development of a new legal framework surrounding IZ planning, creation and development. A key assumption underlying this outcome is that institutional and governance changes will enable the implementation of new models for the IZ development and management of industrial zones (such as those being piloted under the compact) that aim to increase investment in IZs and address the problem of undervaluation of land by reducing incentives for speculation. This subsection highlights the institutional and governance challenges facing efficient IZ development, as gleaned from interviews.

Restrictive laws and onerous procedures are associated with identifying, acquiring, and developing land inhibit industrial zone development in Morocco. Challenges related to mobilizing land—when and where it is needed—continue to be pervasive. For example, if public land (that is, land owned by the State or communal land owned by local authorities) is not already identified and assigned for the development of an industrial zone, land acquisition involves obtaining relevant exemptions from applicable laws through a protracted legal process. This can involve multiple stakeholders playing distinct roles, including identifying the area needed, engaging financial backers and structuring project finances, and monitoring implementation. The presence of prior occupants or, in some cases, illegal squatters can

complicate this process further. For example, the discovery of prior occupants during each stage delayed the tranche-by-tranche development of the Midparc Industrial Free Zone in Nouaceur. The development of mutually agreeable solutions jointly with commune-level authorities responsible for overseeing the land proved necessary to relocate the occupants.

Acquisition of private land—although less common—can take longer than the acquisition of public land. For example, acquisition of land that is managed by a *habous* (religious trust) involves, first, approaching the Ministry of Habous and Islamic Affairs to ascertain whether the status of the land is in dispute. This is typically followed by the establishment of a commission by the *wali* (regional governor), consisting of various local, regional, and national bodies (including the municipal authorities, relevant *Centre Régional d'Investissement*, and Ministry of Interior), although the precise process can vary depending on the status of the land and the management structure of the planned project. Finally, agreements outlining the roles and responsibilities of different stakeholders (for example, those responsible for financing or for obtaining relevant authorizations) are signed, after which the commission meets periodically to monitor implementation progress and address any bottlenecks. Altogether, the process typically takes 5 to 10 years and reportedly can take up to 20.

Private-sector involvement in development of zones

A key short-term outcome for the Industrial Land Activity is increased involvement of the private sector in zone development. This is expected to be achieved through the development of standards and practices that support market-driven IZ development and reduce incentives for use of industrial land for unproductive or speculative purposes. Stronger involvement of the private sector in the development and management of IZs is, in turn, expected to enable a closer match between the supply of and demand for industrial land. This subsection reports on the obstacles inhibiting greater private-sector involvement in zone development as gleaned from interviews.

The industrial land sector is currently dominated by a strong presence of the State in the conception and development of industrial zones. Through various ministries and other relevant agencies, the public sector "identifies land, obtains necessary approvals, develops the land into industrial zones, markets the resulting projects, provides subsidies to investors, and sells the lots" (World Bank 2007). One respondent noted that this approach contrasts with other models of industrial zone development prevalent in other countries, which leverage contributions from private industry for zone development, management, and upkeep to varying degrees (UNIDO 2019). In contrast, the "renter" model under which Morocco's industrial zones are organized—whereby each firm in a zone contributes only to the development of its own lot independently—necessitates greater reliance on local governments for wider zone development, upkeep, and provision of services.

Speculative investments also limit the productive potential of industrial zones. The ability to acquire subsidized industrial plots and resell them later in a more competitive market at substantially higher prices disincentivizes investments in developing industrial land for productive purposes. As noted above, delays associated with legal proceedings hamper efforts to reacquire underutilized

> *"Another factor, in my opinion, is speculation. In Morocco…we always see in the land an investment opportunity. And this is what happened in several industrial zones, where we found ourselves with private individuals who wanted to take advantage of the opportunity presented to them by the [low] price per square meter, and who acquired lots in the expectation of reselling them or renting them once the price had increased. The result: ghost industrial zones with lots sold but not developed."*
>
> — MCA-M representative

plots from owners unwilling to sell, even if the plots are not being used for productive purposes. Multiple respondents suggested that improving zone governance (for example, by strengthening the power of zone managers and associations to restrict the use of plots for unproductive purposes) might help to partly address this challenge. Other approaches (such as a tax on undeveloped land) have also been considered in the past to disincentivize speculation (World Bank 2007).

IZ management, maintenance, and operation

The Industrial Land Activity aims to improve zone performance to foster higher demand for industrial land. This is expected to be achieved by increasing private-sector involvement in the management, maintenance, and operation of IZs, which in turn will result in the provision of better and more reliable services that are more responsive to the needs of zone-level firms. This subsection summarizes some of the operational challenges facing firms operating within IZs.

Despite broad acknowledgment of its importance for zone operations, the quality of management across industrial zones is inconsistent. For example, baseline KIIs intended for zone managers of the two brownfield demonstration zones (Had Soualem and Bouznika) were instead conducted with presidents of existing tenant/firm associations as these zones did not yet have zone managers in place.[63] This may have also given rise to potential differences in the scope of management responsibilities across zones (for example, maintenance tasks being overseen by zone managers where they were in place and other actors where they were not).

Respondents report challenges associated with management of daily zone operations (for example, security services, lighting, waste removal) as well as of zone lots (such as sales/rental processes). For example, industrial waste removal is the service that firms report needing most. However, a lack of clarity surrounding the role of local authorities in providing waste-removal services within zones has resulted in some firms resorting to relying on private service providers. Similarly, older zones have struggled to deal with existing institutional issues inherited from when they were first established. For example, the original occupants of lots in the industrial zone in Tetouan, established in the 1980s, received land titles. Subsequent efforts to acquire and reallocate these lots to users who will use them more productively have thus required litigation, even if the lots are currently engaged in non-productive uses (such as for storage) or being held for speculative purposes.

"There is one last service that we have added, which is the daily management of the public lighting network as it was poorly managed by the municipality. We took it over because we had recurrent lighting failures, and we could not allow this to continue—we cannot keep people in the dark. So, we recruited a company that oversees daily management and maintenance."

— FONZID grantee

There is demand for improving provision of zone-level infrastructure and services. For example, as in the case of industrial waste removal, challenges associated with the lack of lighting at night have caused security concerns for workers, resulting in firms within one zone attempting to raise funds to hire security guards as a temporary solution. Another respondent similarly noted that the municipality's management of zone-level lighting services was poor and resulted in recurrent lighting failures, necessitating the hiring of a private firm to carry out routine maintenance. Firms' willingness to pay for private provision in this way suggests that there is unmet demand for improvements in basic services. At

[63] Associations were also in place at baseline in each of the zones where FONZID-supported projects are located.

the same time, multiple respondents noted that zones provided or were planning to introduce a suite of auxiliary zone-level services with the intention of increasing the attractiveness of zones for potential investors, including support services for investors for acquiring necessary permits, connections to the public transportation network, and establishments such as restaurants, cafes and *hammams* (saunas/baths).

Gaps in zone-level service provision appear to limit women's labor-force participation. Zone-level security concerns (stemming, for instance, from poor provision of lighting at night) disproportionately affect women employees. Other services that would foster women's labor-force participation within the zones include gender-segregated toilets and day care services, the latter of which will be provided for the first time in industrial zones in Morocco with FONZID support. Needs assessments to determine the full extent of zone-level service-related constraints facing women are ongoing, and the specific set of compact-supported initiatives needed to address existing challenges is still being planned.

Private investment of industrial firms

The Industrial Land Activity aims to ensure that the development of IZs is demand-driven and responsive to the needs of potential investors, which is expected to catalyze increased-private sector investment in IZs. A key assumption underlying this outcome is that there is unmet firm-level demand for industrial land, and that matching the characteristics of land in new and existing zones with that demand (for example, in terms of firms' preferences for zone location, size and price of lots, and zone infrastructure) will help address the mismatch between supply and demand. This subsection summarizes characteristics that firms indicate make IZs more desirable, as well as approaches that zone managers have used to engage potential investors.

The main benefit for investors is location, including proximity to major urban areas and access to a qualified workforce. Multiple respondents highlighted the potential advantages of the location of Morocco's industrial zones. Bouznika, for instance, is located on an easily accessible motorway axis about halfway between Casablanca and Rabat, increasing access to domestic markets for products produced in the zone as well as export opportunities through the port at Casablanca. The proximity to major urban centers potentially brings with it access to a relatively more skilled, qualified workforce. However, this has not always translated into stable access to a workforce. Employers in zones located outside major urban areas often cannot compete with those in urban areas (for example, in terms of salaries) for more skilled workers (such as engineers).

> *"Location is the main benefit. We are extremely close to the port/sea as well as the city center, which is central for all the businesses. This really helps streamline business flows for companies and investors."*
>
> — FONZID grantee

In line with the goal of increasing private investment of industrial firms in supported zones, multiple channels are being used to attract new investors. One respondent highlighted the importance of partnerships with the appropriate *Centre Régional d'Investissement* (CRI) and/or MIC as potential tools for identifying and directing investors to the zone. These relationships leverage the existing roles played by these institutions. For example, the role of the CRI is primarily to centralize and simplify the process of starting and operating a business in the country (including requesting authorization for the acquisition of land) by serving as an intermediary between entrepreneurs and relevant administrative bodies. Word of mouth also appears to be an important source of attracting new investors, particularly if established, long-term investors recommend the suitability of an industrial zone. Some industrial zones are also relying on creative communications strategies that leverage social media. For example, the FONZID-supported

industrial zone of Ain Johra reportedly used LinkedIn in combination with on-site events to highlight the zone's advantages to potential investors.

Industrial land occupancy

High rates of zone occupancy and the widespread use of occupied industrial land for productive purposes are key to improving zone performance. In addition to supporting the development of new legal frameworks, standards and practices that reduce incentives for unproductive, speculative uses of industrial land, the Industrial Land Activity aims to promote greater rates of zone occupancy by demonstrating the viability of new models of zone development and management. A key assumption underlying this outcome is that the PPP models being piloted under the compact result in supported zones becoming more attractive for the private sector, resulting in greater investment. This subsection summarizes the key challenges facing IZ occupancy and land use as gleaned from interviews.

Most lots in the zones implicated in the activity have reportedly been leased or sold (Table III.2). For example, one zone manager indicated that of 200 lots in their zone, only three were currently vacant.

Table III.2. Baseline land utilization in selected compact-supported zones

Zone type	Zone name	% of lots of leased/sold[a]	% of lots developed[b]
Demonstration	Had Soualem	100	70
	Bouznika (1st tranche)	100	46
	Bouznika (2nd tranche)	100	25
FONZID	Sidi Bernoussi	100	90
	Tassila	100	55
	Tétouan	100	72
	Ain Johra	50	6

Note: [a]*Taux de commercialization*. [b]*Taux de valorisation*. Source: Mathematica calculations using 2015 data from the MIC Industrial Zone Database. Baseline data are unavailable in the database for the following zones: Sahel Lakhyayta; Tawfiq Jadida; Ahl Loughlam; Tatmine-DECZID; and Fez Smart Factory.

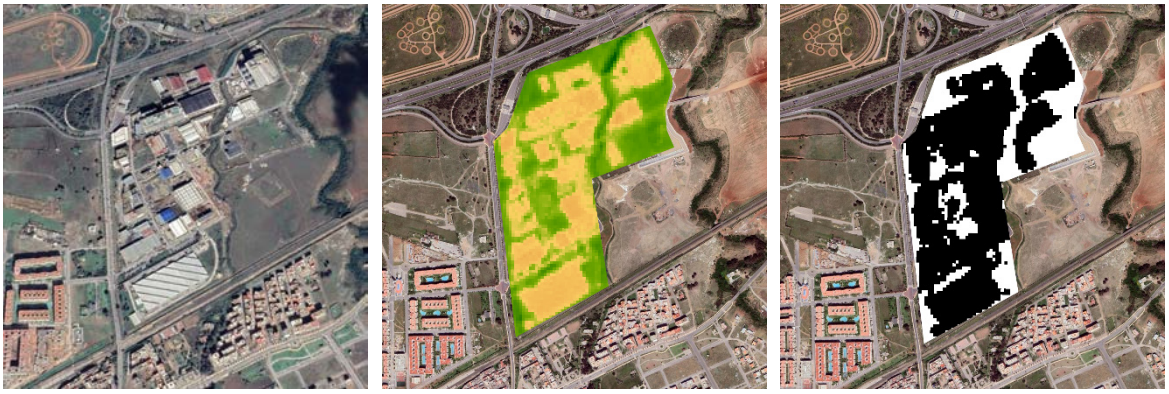
To shed additional light on industrial land-use patterns, we rely on remotely-sensed data that highlight zone-level built-up area. Because of the spatial resolution of these data, they are better suited for tracking changes over large tracts of land. For this reason, we restrict these analyses to the PPP demonstration zones, in which the compact supports more comprehensive zone-level construction, revitalization and expansion activities relative to the FONZID-supported sites. In addition, to characterize baseline levels and trends of remotely sensed outcomes appropriately, this report focuses on the original zone boundaries of the two brownfield demonstration zones (Bouznika and Had Soualem) that existed before the signing of the compact.[64] **Figure III.1** depicts the results from a simple algorithm to use the normalized difference vegetation index (NDVI) to facilitate the identification of undeveloped areas within the boundaries of the zone of Bouznika in 2018.[65] Specifically, green (grass or other vegetation) and brown

[64] We exclude Sahel Lakhyayta, as it is a new industrial zone that has not yet been developed and thus would not be suitable for an assessment of baseline levels of built-up surface area and nighttime luminosity. We similarly exclude the extension projects of the existing industrial zones at Bouznika and Had Soualem, which will be supported by the compact.

[65] The normalized difference vegetation index (NDVI) is an indicator that describes the difference between visible and near-infrared reflectance of vegetation cover (Weier and Herring, 2000). As such, it can be used to distinguish and assess the distribution of various surface-level characteristics (such as vegetated areas, soils, water bodies, and built-up areas and urban environments).

(dirt or sand) areas in the satellite image of the zone (left panel) represent areas without buildings or other built-up surfaces. These areas show up as relatively green (high NDVI) areas in the middle panel, which presents average NDVI values within the boundaries of the existing zone for the year 2018. Finally, the right panel presents results from using a threshold-based approach to translate average NDVI values into a binary outcome, showing low-NDVI pixels (that is, more likely to represent built-up surface areas) as black. This panel indicates that about two-thirds of the surface area of the existing zone of Bouznika was built up in 2018.

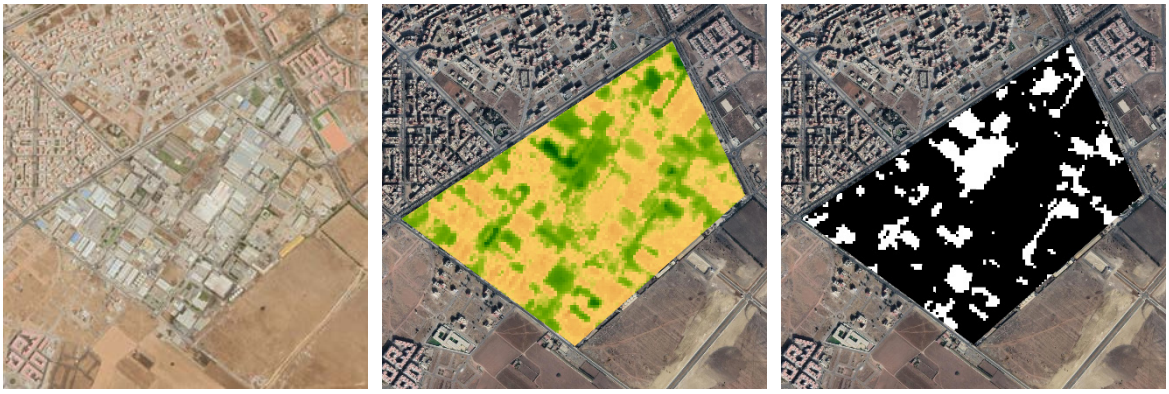
Figure III.1. Detecting undeveloped land in the industrial zone of Bouznika



Note: Left: Aerial image of the Bouznika industrial zone. Middle: Composite values of the Normalized Difference Vegetation Index (NDVI) averaged over 2018. Green areas represent high NDVI values (more likely to be vegetation), whereas yellow values represent low values. Right: Output from a binary transformation of the middle panel, with pixels whose NDVI values exceed 0.15 appearing in white (high NDVI) and low NDVI pixels in black.

Figure III.2 depicts the results from repeating this exercise for the boundaries of the existing zone of Had Soualem. About 79 percent of the of the surface area of the zone was built up in 2018.

Figure III.2. Detecting undeveloped land in the industrial zone of Had Soualem

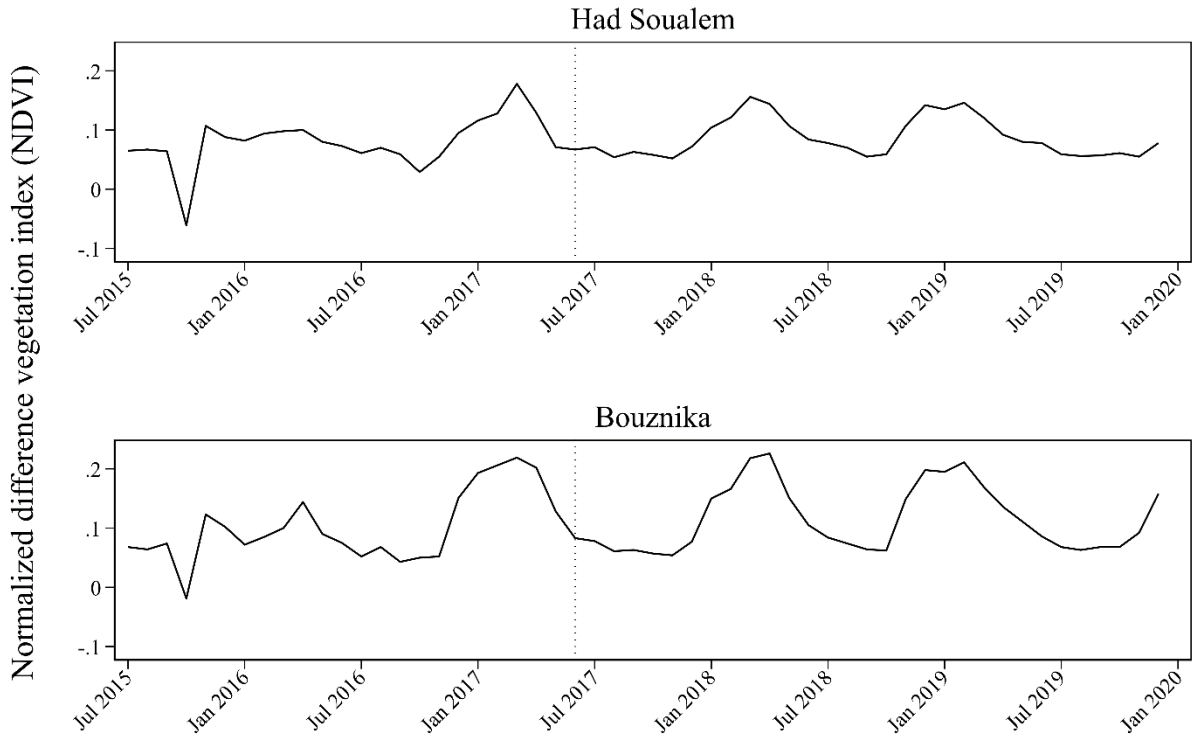


Note: Left: Aerial image of the Had Soualem industrial zone. Middle: Composite values of the Normalized Difference Vegetation Index (NDVI) averaged over 2018. Green areas represent high NDVI values (more likely to be vegetation), whereas yellow values represent low values. Right: Output from a binary transformation of the middle panel, with pixels whose NDVI values exceed 0.15 appearing in white (high NDVI) and low NDVI pixels in black.

Last, **Figure III.3** plots the monthly average NDVI for both zones between 2015 and 2019. This figure highlights seasonality in the zone-level NDVI. Specifically, the peaks of troughs of this figure highlight the onset and decline in green vegetation, respectively, associated with changes in seasonal conditions.

Accounting for these seasonal trends suggests that levels of built-up area (as proxied by trends in NDVI) over time have been relatively stable. Taken together, these baseline findings point to limited room for additional expansion of built-up area within the original zone boundaries of the two brownfield demonstration zone, and highlight the potential pathways through which zone expansion under the compact might increase industrial built-up area.[66]

Figure III.3: Time series average NDVI of Had Soualem and Bouznika industrial zones



Note: Values represent the mean, monthly NDVI over all pixels encompassed by the Had Soualem industrial zone (top panel) and the Bouznika industrial zone (bottom panel).

In addition, only a subset of built-up lots is currently being used for productive purposes. One zone manager noted, for instance, that only about half the businesses renting lots in the zone used them productively, whereas the rest often used lots for storage. Historical institutional factors partly appear to drive low utilization of lots. For example, a subset of lots in the Benslimane industrial zone were reportedly allocated to urban artisans, many of whom lacked the financial resources needed to develop the lots further, and they were also restricted from selling their lots to other interested parties, which resulted in underinvestment and low utilization.

The low share of investors in the zones using the lots productively inhibits the ability to form an active tenant/firm association, which in turn limits the extent to which new initiatives can be devised and implemented. This is partly due to the fact that not all zones were established with a prior requirement to set up an association in place. In such zones, firms may be reluctant to start pay the dues

[66] In the endline report, we will extend these analyses to also cover the tracts selected for zone expansions, in which built-up area is expected to change relatively rapidly over time.

needed to establish and maintain an association, particularly if they do not believe the services provided and tasks performed by the association are critical to business operations. To address this concern, some zones (such as Tassila) have instituted approaches to legally reacquire lots that were not being used and compensating previous owners based on lot price. In contrast, newer zones outline that dues need to be paid cover services as part of sale/lease agreements.

Job creation

The logic model posits that market-driven models for zone development and management will foster better functioning IZs that have characteristics that respond to firms' needs and preferences, resulting in greater private-sector investment in zones. Subsequent zone-level expansion of existing firms as well as the creation of new businesses will in turn have a positive impact on jobs. This pathway assumes that the PPP models of zone development and management being piloted under the compact enhance the attractiveness and profitability of zones for the private sector. It also assumes that broader economic conditions will be conducive to greater private-sector investment and resulting job creation. In addition, zone-level barriers to implementation of the PPP-based approaches that reduce the availability of industrial lots (such as conflicts between tenants in compact-supported zones) may further limit the extent to which this outcome is achieved. This subsection highlights the key baseline challenges relating to zone-level job creation gleaned from our interviews.

Firms in zones reportedly struggle to hire workers with specialized industrial skills. Both skilled and semi-skilled workers (such as electrical engineers and trained welders, respectively) are in high demand. However, given the peri-urban/rural nature of the location of some industrial zones, firms typically must hire qualified workers from larger urban areas (such as Casablanca or Mohammedia), where wages for such workers are higher.

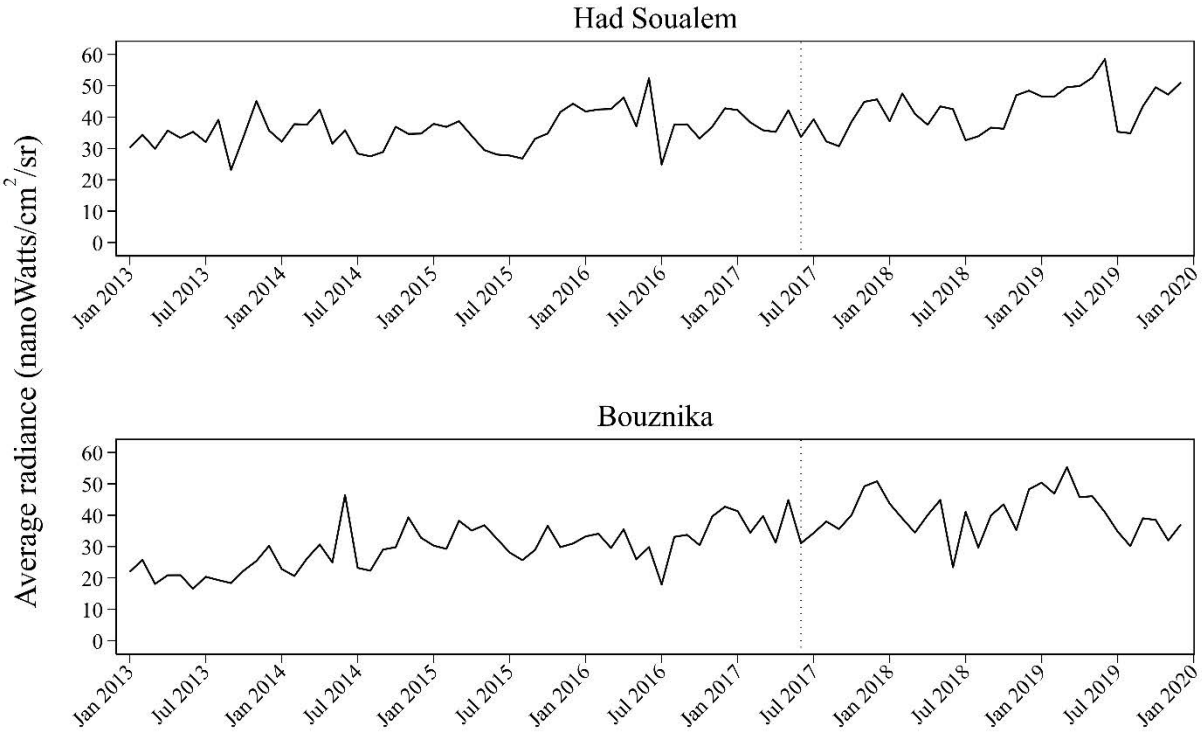
> *"There is a good training center in Bouznika, but it's far and graduates from that center go get jobs in Casablanca or Rabat instead. Generally, people want to leave the area so there is not much interest in stays among those who can get jobs elsewhere"*
>
> — Zone association president

Experience with providing training to meet existing skills gaps has been mixed. Trainings have attempted to target zone-level needs. For example, the Benslimane industrial zone provided training in textile work to women following the opening of a small cluster of textile companies in the area in response to demand from textile firms for female employees. Similarly, some *Office de la Formation Professionnelle et de la Promotion du Travail* (OFPPT) training centers located near zones provide relevant technical training (such as in industrial maintenance, logistics and operations, machinery operator) through diploma and certificate programs. However, there is not always a clear agreement or partnership between OFPPT centers and neighboring industrial zones, which results in misalignment between the needs of zone-level firms and the profiles of newly trained workers. In addition, the quality of the training provided across centers is inconsistent, and graduates of the better centers reportedly prefer to get work in larger urban areas, where wages are higher.

To better understand zone-level job creation in the context of expansion of zone-level businesses, we rely on data on nighttime lights, which is widely used to track levels of economic activity over time (Chen and Nordhaus, 2011). As with analyses of remotely sensed data on built-up areas described previously, the baseline report's analyses of nighttime luminosity focus on the original zone boundaries of the two brownfield demonstration zones. **Figure III.4** plots the monthly average luminosity of the Had Soualem and Bouznika industrial zones between 2013 and 2019. In both zones, nighttime luminosity trended

upward over this period, indicative of increasing economic activity and job creation in the zones.[67] In addition, taken together with the relatively stable trend in built-up area over a similar period shown in Figure III.3), this suggests more intensive use of existing buildings and other built-up infrastructure by firms in the two zones over time.

Figure III.4. Time series average radiance of Had Soualem and Bouznika industrial zones



Note: Values represent the mean, monthly nighttime lights intensity over all pixels encompassed by the Had Soualem industrial zone (top panel) and the Bouznika industrial zone (bottom panel).

[67] As with analyses relating to remotely sensed built-up areas, in the endline report, we will extend these nighttime luminosity analyses to cover also the tracts selected for zone expansions.

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IV. Evaluation Administration

In this section, we cover the administration of the evaluation, including the human subjects' review of data collection, data access and privacy, dissemination plan for the report, and evaluation team roles and responsibilities.

A. Summary of Institutional Review Board requirements and clearances

For this report, Mathematica ensured that the study meets all U.S. and Moroccan research standards for ethical clearance.

Household & crop cut survey. C&O/Chezeen was contracted by the MCA-Morocco to collect the first round (baseline) of the household and crop cut survey data. Mathematica obtained institutional review board (IRB) approval for baseline evaluation, starting with qualitative data collection from Health Media Labs (HML) on February 28, 2022. HML was updated each time we finalized an instrument or research protocol. HML's IRB process takes an active role in helping guide protocols to meet the highest standards for human subject protections. Their IRB requires that research protocols provide sufficient detail to ensure that (1) the selection of subjects is equitable, subjects' privacy is protected, and data confidentiality is maintained; (2) informed consent is written in language that study participants can understand and is obtained without coercion or undue influence; and (3) appropriate safeguards protect the rights and welfare of vulnerable subjects.

Qualitative interviews. Mathematica obtained IRB approval for qualitative data collection from Health Media Labs on February 28, 2022. For the approval, we provided three sets of documents. The first document contained the qualitative research protocol, in which we (1) described the purpose and design of the evaluation, and (2) provided information about our plans for protecting study participants (including their confidentiality and human rights) and how we would acquire consent for their participation. The second set included the qualitative instrument and consent form that we planned to use for the evaluation. The third document was a completed IRB questionnaire with information about the research protocol, how we would securely collect and store our data, our plans for protecting participants' rights, and any possible threats to participants resulting from any compromise of data confidentiality.

B. Data access, privacy, and dissemination plan

Data access and privacy. The survey data collected for this report were securely transferred from C&O/Chezeen to Mathematica, stored on Mathematica's secure server, and accessible only to project team members who used the data. After producing and finalizing the endline evaluation report, we will prepare corresponding de-identified data files, user manuals, and codebooks based on the quantitative survey data. We understand that these files could be made available to the public; therefore, the data files, user manuals, and codebooks will be de-identified according to MCC's most recent guidelines. Public-use data files will be free of personal or geographic identifiers that would permit unassisted identification of individual respondents or their households, and we will remove or adjust variables that introduce reasonable risks of deductive disclosure of the identity of individual participants. We will also recode unique and rare data by using top and bottom coding or replacing these observations with missing values. If necessary, we will also collapse any variables that make an individual highly visible because of geographic or other factors into less-easily-identifiable categories.

Mathematica received the data for the household and crop cut survey through a secure transfer site and through the survey collection platform itself.

Dissemination plan. To ensure that the results and lessons from the evaluation reach a wide audience, we will work with MCC to increase the visibility of the evaluation and findings targeted to the agricultural sector, particularly for policymakers and practitioners. We will present findings from each round of data collection in baseline and other subsequent evaluation reports. We will distribute draft reports to stakeholders for feedback before finalization and will present findings at MCC headquarters in Washington, DC, and MCA-M headquarters.

We expect the practitioners of broader research to have a strong interest in the evaluation. To facilitate wider dissemination of findings and lessons learned, we will collaborate with MCC and other stakeholders to identify additional forums (conferences, workshops, and publications) for disseminating the results, and we will encourage other donors and implementers to integrate the findings into their programming.

C. Evaluation team roles and responsibilities

Our team is made up of researchers with expertise in land governance in Morocco, an understanding of local climates, customs, proficient French and Arabic speakers, and a solid background in conducting impact and performance evaluations in land and diverse sectors in the region. The evaluation team includes the personnel described in Table IV.1.

Table IV.1. Evaluation team members

Evaluation team members	Role	Responsibility
Mr. Matt Sloan	Project director/primary point of contact for client	Communicating with client, coordinating with key stakeholders, overseeing evaluation budget, overseeing survey, and conducting qualitative data collection, managing evaluation team staffing and priorities; primarily responsible for delivering high quality products that meet MCC's and other stakeholders' needs
Dr. Anthony Harris	Principal investigator	Leading the evaluation design and data analyses, overseeing the execution of the quantitative components of the design and data collection, providing oversight of measurement, ensuring research questions are answered with appropriate methods
Ms. Sara Litke-Farzaneh	Researcher	Leading qualitative and crop cut survey data collection and analysis, supporting evaluation design decisions and data collection approaches, acting as a senior advisor to the evaluation team
Ms. Elena Moroz	Researcher	Supporting quantitative and qualitative analysis of Industrial Land components, developing qualitative instruments, and writing report deliverables
Dr. Faraz Usmani	Researcher	Supporting quantitative and qualitative analysis of Industrial Land components, developing qualitative instruments, and writing report deliverables
Ms. Hailey Hannigan	Research Associate	Supporting the collection of high-quality qualitative data and political economy analysis, and survey management
Ms. Rachel Sander	Research Analyst	Supporting quantitative data collection, report writing, and overseeing data quality
Ms. Sarah Leser	Research Analyst	Supporting qualitative data collection and analysis, report analysis, and other research support
Mr. Morad Said	Local consultant	Providing technical expertise on land evaluations in Morocco, acting in-field liaison between the evaluation team and data collection team
Mr. Kamal Moudi	Local consultant and data quality assurance	Helping ensure high-quality data collection measures and coordinating with the data collection team; on-the-ground support during household and crop cut survey data collection

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Annex A. Original evaluation questions

MCC M&E recently revised their approach to evaluations, with the aim of focusing on two key questions across evaluations. These are:

EQ1: To what extent was the project implemented according to plan (in terms of quantity and quality of outputs)?

EQ2: Did the project achieve its stated objective in the timeframe and magnitude expected, as documented in the M&E Plan? Why or why not?

MCC M&E has also shifted away from having the independent evaluator conduct an economic analysis or re-calculate the Economic Rate of Return. Mathematica will incorporate the two questions into the evaluation (including into the baseline report currently being drafted) and will drop the economic analysis from the evaluation design. We will continue to address the original questions to the extent that they map to the revised questions and reflect key elements of the Activities' program logic, objectives, or implementation. Table A.1 provides a mapping of the original evaluation research questions (RQs) to the revised evaluation questions (EQs).

Table A.1 Original evaluation questions mapped to revised evaluation questions

Original question	Revised question	Notes on changes to the evaluation design
Overarching/Project-wide questions		
RQ1: Were the activities implemented as planned?	EQ1	No revisions
RQ2: What were the implementation challenges and successes?	EQ1	No revisions
RQ3: Has the project resulted in the short-, medium-, and long-term outcomes outlined in the program logic?	EQ2	No revisions
RQ4: Has the project resulted in reduced time for property transactions?	EQ2	The original design proposed a quantitative trend analysis to measure changes in transaction times for the Rural Land Activity, which will not be possible without data from ANCFCC. Instead, we propose addressing this question using analysis of qualitative data from Rural Land stakeholder interviews.
RQ5: What is the project's impact on land tenure security and land-related disputes?	EQ2	No revisions
RQ6: Are the new land systems and procedures likely to be sustainable? Why or why not?	EQ2	No revisions
RQ7: How and why do the project's benefits and costs accrue differently to different groups?	EQ2	No revisions
~~**RQ8:** What lessons can be applied to future economic models for land projects?~~		This question relates to the evaluator economic analysis, which MCC M&E has asked us to remove from the evaluation design. We propose dropping this question.
Land Governance Activity[a]		
RQ9: How did the activity improve coordination, transparency, and efficiency in land governance?	EQ2	No revisions
RQ10: Are structures such as the economic cadaster and the women's land center (CIWL) still in place and functioning? Is there increased collection and availability of gendered data?	EQ2	No revisions

Original question	Revised question	Notes on changes to the evaluation design
RQ11: What is the impact of the Information-Education-Communication (IEC)/sensitization related to law 62.17 on the perceptions of training participants (including women) on women's rights and ability to access land?	EQ2	No revisions
Rural Land Activity		
RQ14: What are the social and economic effects of *melkisation*? Have formal land titles led to changes in perception of tenure, investment in land, access to credit, or changes in productive use of land? Are there any gender or intra-household differences in effects?	EQ2	No revisions
RQ15: What is the activity's impact on household income and agricultural productivity?	EQ2	No revisions
RQ16: What is the impact of the activity on participants' access to credit, including the impact on the cost or terms of financing such as public subsidies? If there is no impact, what are the other binding constraints to access to finance?	EQ2	No revisions
Industrial Land Activity		
RQ17a: How has the activity contributed to changes in the development, management, and maintenance of industrial zones?	EQ2	Drop benchmarking analysis due to non-response from zone managers in benchmark zones. Instead, we will rely on analysis of qualitative data from firms and zone managers in zones affected by the activity.
RQ17b: Has private sector involvement in these areas increased and, if so, to what effect?	EQ2	Drop benchmarking analysis due to non-response from zone managers in these zones. Instead, we will rely on analysis of qualitative data from firms and zone managers in zones affected by the activity.
RQ18: What is the total private investment in the development of the three pilot demonstration industrial zones under PPPs?	EQ2	No revisions
RQ19: What is the number of hectares of previously undeveloped land that has been put into use in the existing INDUSTRIAL ZONEs targeted by the project, both in terms of gross area and area used by enterprises?	EQ2	No revisions
RQ20: How many jobs were created in the zones covered by the compact (including the demonstration zones and zones supported under FONZID), measured as the number of full-time employees added after the project?	EQ2	Without firm-level survey data and CNSS, we will have to rely on qualitative estimates of job creation.
RQ21: How have levels of investment and productive use of land changed in the demonstration zones compared to other zones in Morocco?	EQ2	No revisions
RQ22: How has the delivery of land to market changed in the industrial zones targeted by the project? On the supply and quality of land in industrial zones? On occupancy and utilization rates of land in industrial zones?	EQ2	No revisions

a - The Land Governance Activity questions reflect new questions agreed on with MCC. These are based on the revised activity scope and program logic. See the Evaluation Design Report (Harris et al. 2020) for the original evaluation questions.

FONZID = *Fonds des Zones Industrielles Durables*; PPP = public-private partnership; RQ = research question; CNSS : Caisse Nationale de Sécurité Sociale

Annex B: Land Productivity Project data collection and sampling

This Annex describes in more detail our approach to data collection and sampling for both the Rural and the Industrial Activities.

A. Quantitative - Rural Land Activity

The quantitative analysis is based on data collected using a multi-topic household survey, designed around measuring the key outcomes identified in the program logic. Data was collected from households that own and operate parcels of collective land in the two regions where the *melkisation* program is taking place: Gharb and Haouz. The sample of households is selected by choosing a parcel of land from a sample frame of existing parcels[68] located within collectives that either participate in the *melkisation* program (treatment group) or do not (control group). We then develop appropriate survey weights based on the probability of selecting a parcel to the sample from the sample frame. As a result, the final sample is representative of parcels owned by owner-operators located in the collective. The following sections discuss the survey, sampling approach, and response rates.

1. Survey description

Field work took place from the beginning of August 2022 to the middle of September 2022. The survey was conducted with a sample of 3,212 households that own and operate collective land in Gharb and Haouz. The sample includes both households that will benefit from the *melkisation* program supported by MCC (the treatment group) and nearby households that own collective land in collectives that are not part of the program (the control group). In Gharb, the sample consists of 1,596 completed cases (783 treatment and 813 control) and in Haouz, the sample consists of 1,616 households (805 treatment and 811 control). See the next section for details on the approach to sample selection.

As described above, households were identified based on whether they are the owner (or de-facto owner) of the sampled parcel, which we refer to as the target parcel. For each sampled household, the data collector was required to conduct up to two surveys with up to three potential respondents:

- **Principal respondent.** The farmer survey was always conducted with the **principal respondent**, defined as the person who owns the target parcel.
- **Farm operator respondent.** In cases where the principal respondent is not the primary farm operator, sections of the main survey pertaining to agriculture were conducted with the most knowledgeable person involved in running the household farm.
- **Spouse respondent.** If the principal respondent was married, a second survey was conducted with their spouse.

Table B.1 describes the survey modules included in the surveys conducted with the principal respondent (the owner of the target parcel) and their spouse. Both the farmer and spouse surveys posed questions related to household member demographics, land tenure and security, legal knowledge of land rights, and credit access. The farmer survey collected additional data on household assets, participation in land markets, agricultural practices and investments, and agricultural productivity (including crop selection,

[68] We used parcel boundaries covering all land within selected treatment and control collectives from the 2014-2015 round of the National Agricultural Census (*Recensement National Agricole* (RNA)) conducted by the Ministry of Agriculture.

area, harvest, and revenue). Survey questions were asked at different levels (for example, questions about tenure security were asked about the target parcel only, while questions about output for wheat were asked at the level of the farm). The level of data collection was determined through extensive instrument testing and piloting, with the aim of balancing the need for disaggregated data and broad topic coverage, with limiting respondent burden.

Table B.1. Survey modules, example topics and level of data

Survey module	Example topics	Level of data collection	Survey
Household roster	Demographic information Education Employment	Individual household member	Farmer survey
Parcel roster	Land use Parcel area Ownership*	Parcel	Farmer survey
Land sales and rental	Land purchased/sold (# of transactions; ha) Land rented in/out (# of transactions, ha)	Parcel	Farmer survey
Agricultural production, input use and harvest (farm level)	Input use and input costs (fertilizer, hired labor, machinery and equipment, improved seeds, irrigation) Output Income by crop	Farm	Farmer survey (Operator)
Agricultural production, input use and harvest (parcel level)	Irrigation access Crop choice Number of trees	Parcel	Farmer survey (Operator)
Tenure security, land rights and legal knowledge	Subjective perceptions of tenure security Ownership structure, decision making among joint owners Number of land owners on title Legal knowledge Land conflicts and redressal	Target parcel	Farmer survey Spouse survey (subset of questions)
Assets and investment	Productive assets (machinery, irrigation equipment, livestock) Consumer durables Decision-making around assets	Household	Farmer survey Spouse survey
Access to credit	Applied for loan(s) Number of loans approved Size of loan(s) Terms of loan(s) (cost of borrowing) Purpose of loan(s) Collateral used for loan(s), including land	Household	Farmer survey Spouse survey (subset of questions)

The section on land tenure and security incorporates elements of the IFPRI's WEAI. This is a set of indicators that aim to assess the extent of women's empowerment in the agricultural sector. The indices measure decision-making power of women regarding agricultural production, access to resources, and agricultural activities. We also employed the Prindex-style indicators measuring the respondent's

perceived level of tenure security. Both the WEIA and Prindex indices allow us to measure constraints to Sustainable Development Goal (SDG) 1.4.2. which aims to increase the percentage of adults who "perceive their rights to land as secure, by sex and type of tenure."

2. Sample selection

As described above we used parcel data from *Recensement National d'Agricole* (RNA) as the sampling frame. Our sample frame is defined as all parcels located within treatment collectives and all parcels located within a selected set of control collectives located within the same regions as the treatment collectives.

The process used to develop the sample was broken into two stages. First, we selected collectives to include in the first stage sample and second, we selected parcels from within collectives. In the first stage, collectives were selected purposively. All treatment collectives included in the *melkisation* program with enough parcels were included in the first stage sample. Second, we selected control collectives based on i) their proximity to the treatment collectives and ii) having enough RNA parcel data to select the sample. Part of this process involved identifying areas[69] within each region that were collective land. In the case of control collectives in Gharb, we were not able to acquire geo-spatial data with the geographic boundaries and names of collectives, so had to rely on secondary documents we acquired from ORMVAG and used communes[70] as our geographic unit.

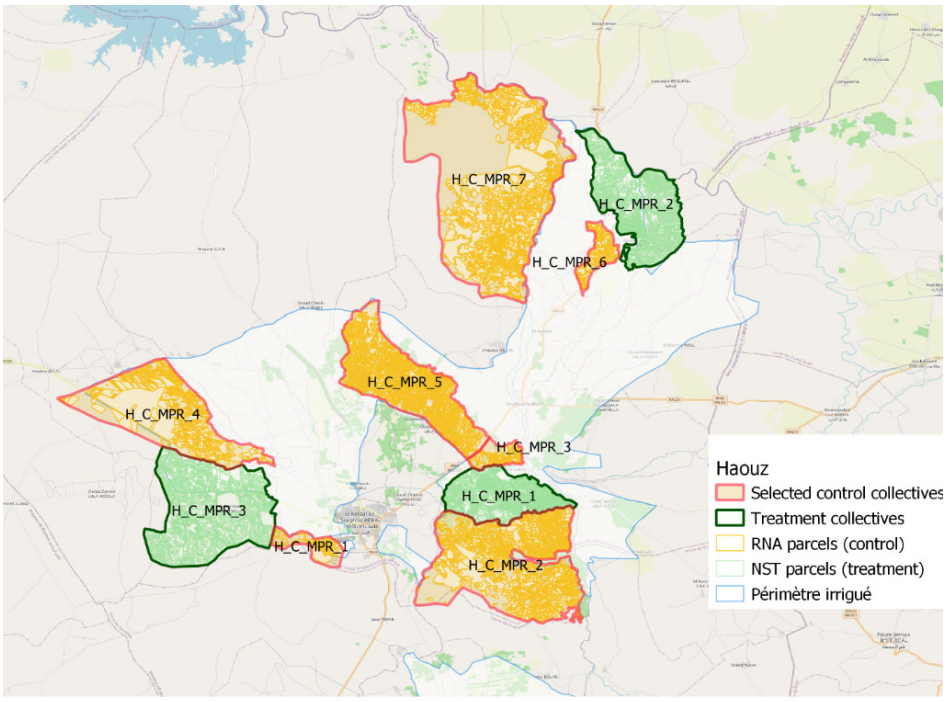
First stage: Selection of collectives for treatment and control areas
Haouz

All three collectives in Haouz that were part of the *melkisation* program were included in the first stage sample. Seven collectives that were located near the treated collectives were proposed for the control group and information on their geographic boundaries were provided by MCA and ORMVAH. These RNA parcels provided the initial sampling frame for sample selection. **Annex Figure B.1** shows the location of parcels within treatment and control collectives in the Haouz region.

[69] Geographic data on collective boundaries was provided by MCA-Morocco or the ORMVA, and originally came from ANCFCC. The boundaries represent the *assiette fonciere* owned by the ethnic collective. However, in Gharb we found several cases where the *assiette fonciere* contained land owned by multiple collectives, and others where an ethnic collective owned land across multiple *assiette fonciere*. We also did not receive definitive geographic boundaries for ethnic collectives in the control group in Gharb.

[70] Communes are the lowest administrative subdivision in rural areas in Morocco. Communes in Gharb may contain multiple collectives, though the land owned by an ethnic collective need not be nested inside a commune.

Figure B.1. Location of treatment and control collectives in Haouz



Source: RNA parcel data, MCA-M project data

Gharb

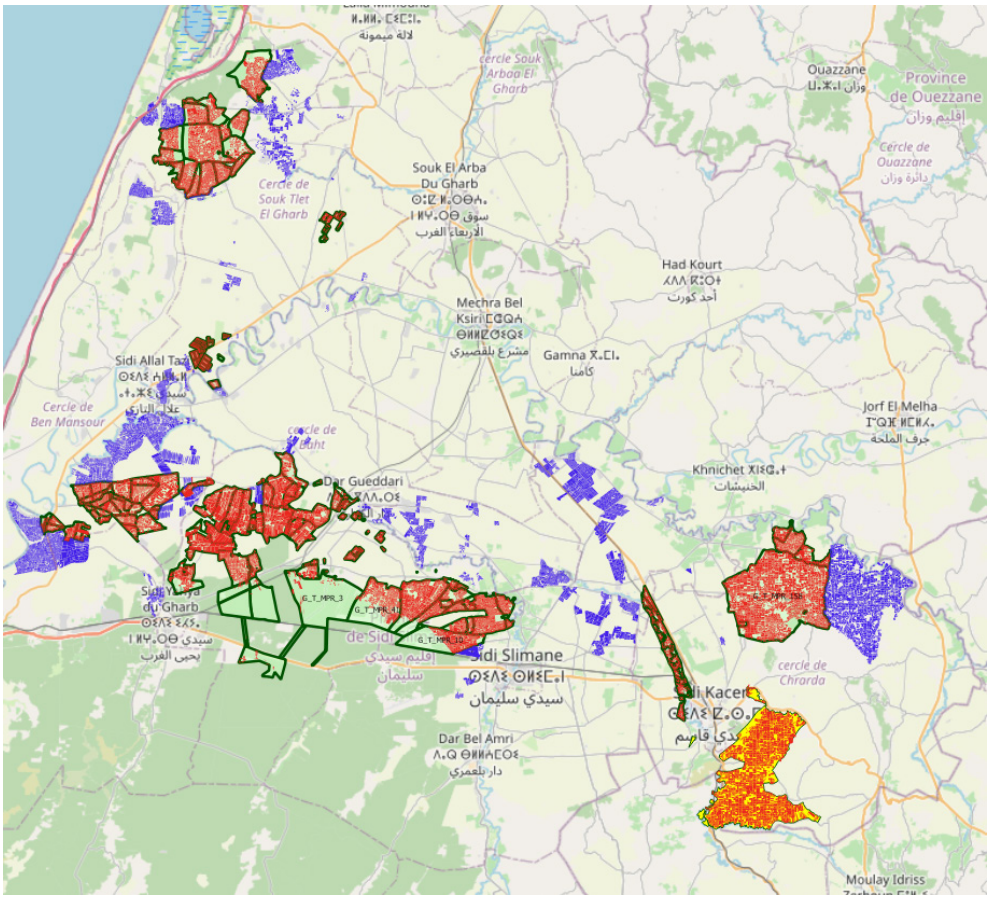
The information used to select collective/commune boundaries for Gharb come from several sources. As with Haouz, information on the treated collective boundaries was provided by MCA-M and all collectives containing RNA parcel boundaries were eligible for the first stage. Information on control communities came from multiple sources, including files provided by ORMVAG, via MCA-Morocco and from a map of collective land prepared by ORMVAG and digitized by Mathematica. (The referenced map is a PDF map showing the location of collective land for the MCA-Morocco project collectives. We were unable to access the Shapefiles used to create it).

The selection of control communities is based on the following criteria:

1. Control areas should be inside or intersecting the irrigation perimeter area managed by ORMVAG (that is, eligible for *melkisation*).
2. Not already *melkise* as part of a previous *melkisation* program.
3. RNA data must be available within the limits indicated by the map.

Additional identifying information about collectives, including information on title or application number (information from the land registry), and collective name is available for some, but not all, of these areas. We therefore organize the control group by commune. **Annex Figure B.2** shows the coverage of the RNA data across treatment and control collectives/communes. Areas in red are treated parcels and areas in blue are control parcels.

Figure B.2. Location of treatment and control collectives in Gharb



Source: RNA parcel data, MCA-M project data and ORMVAG

Number of parcels included in sample frame

After identifying the RNA parcels located within the selected treatment and control areas in Haouz and Gharb, our sample frame consists of 52,808 parcels. In Gharb, the sample frame consists of 17,788 treated parcels and 14,609 control. In Haouz, the sample frame consists of 7,365 treated parcels across and 12,228 control parcels.

Second stage: Selection of parcels within collectives

In the second stage, parcels were selected using a stratified random sampling procedure from within treatment and control collectives in Gharb and Haouz. Parcels were stratified by i) the collective/commune they belong to and ii) by whether the parcel had access to irrigation, based on data from the RNA. The target sample size for each collective or commune was set with the aim of balancing the probability of a parcel being chosen against the need to have a sufficient sample within each collective or commune. Collectives varied significantly in terms of the number of RNA parcels, ranging from as small as 50 parcels[71] in some treatment collectives to over 3,000 parcels in Gharb (all three treatment collectives in Haouz had more than 2,200 parcels). The minimum target sample size was 10 parcels, but

[71] Collectives in Gharb with a very small number of RNA parcels were excluded because we would no have had a sufficient size in these small collectives. This reduced the list of collectives included in the sample from 61 to 52 named collectives. In some cases collectives were combined into a single *assiette fonciere* and it was not possible to directly link the collective name to the RNA parcel.

larger collectives were assigned more than 250 in Haouz and at most 60 in Gharb. Within collectives, parcels with and without access to irrigation were selected in proportion to the share within the collectives. In addition to selecting the survey sample, replacements were selected from within each strata and provided to the data collector.

3. Survey response rates and weights

Process for identifying eligible respondents

After selecting the sample, the data collector was provided with a list of sampled target parcels and satellite base maps that displayed the parcel boundary of the sampled target parcel overlaid on recent satellite imagery. While the sample was selected using the RNA data as a sample frame, we wanted to ensure the enumerators had accurate maps that reflect the current situation. To this end we conducted a spatial match[72] between the RNA parcel and the parcel boundaries collected by NST data, where that data was available. (NST parcel boundaries were available for all treated areas in Haouz and about half of the treated areas in Gharb).

The data collection teams together with the local authorities used the satellite base maps to identify the household linked to the target parcel and then determined whether that households was eligible for the survey. This process of identifying respondents took place as a separate procedure and was also used to identify whether sampled target parcels belonged to eligible respondents. Eligible respondents had to meet the following criteria to be included in the sample and considered the principal respondent:

- The parcel had to be collective or *melk* land (we were not sure if control areas had *melk* land already)
- The parcel had to be used for agriculture
- The survey principal respondent should be the de-facto owner[73] of the parcel if they are available. Owners living outside of the commune were not considered eligible. If an owner was unreachable after three attempts, the target parcel was replaced.
- In cases where there are multiple owners, the data collector was instructed to choose the owner who belonged to the household that also farmed the land. Where multiple owners lived within a household, the data collectors prioritized the individual who was also the primary decision maker about the farm.

Response rates and adjustment to sample frame

The data collector was successfully able to identify almost all parcels thanks to the support, time and detailed local knowledge of the local officials who supported data collection. However, while response rates were generally high, we were asked to stop data collection in parts of Gharb.

[72] This was implemented by identifying the centroid of the sampled RNA parcel and identifying whether the centroid fell within an NST parcel. If it did, the parcel boundary from the RNA data was replaced by the NST. In rare cases, multiple RNA centroid fell within an NST parcel. In these cases the RNA parcel that was selected first was retained and a new replacement parcel was selected.

[73] The de-facto owner was defined as a person with decision-making power over how the parcel is used. This definition was intended to include all types of owners, including people who may not have a legally recognized right to the land, such as non-collectivists.

Changes to initial sample frame (dropped areas in Gharb)

During fieldwork we needed to prematurely abandon data collection in a portion of the treated collectives in the Gharb region. In early August the data collection team operating in Gharb reported that they were facing obstacles to collecting data in some treatment collectives in Sidi Slimane province, arising from the refusal of the population in certain collectives to participate in the farmer survey. These collectives were located in administrative areas (*Caidats*) where the MCA-Morocco Rural Land Activity had also been forced to abandon the *melkisation* program in certain collectives, due to a refusal to participate by the local population (among other reasons). The data collector responded to these blockages by working closely with local administrators (*Caids* and provincial representatives of the Ministry of the Interior) and met with the local population directly, seeking to explain the survey. Ultimately, we were asked to stop data collection due to the risk that continuing the survey posed to the implementation of the Rural Land Activity in these areas. We re-allocated the remaining sample to other treated collectives in other areas. Abandoning treated collectives poses a risk to the evaluation design because our sample no longer represents the treated collectives where no data was collected. The team working in Haouz also had to replace an entire control collective on the advice of local administrators, but this does not pose a risk to the evaluation design since we have sufficient control collectives to draw on.

Response rates

Annex Table B.2 reports on the overall response rates across treatment and control collectives in Gharb and Haouz. Overall 687 sampled target parcels had to be replace, but once we remove the cases where data collection had to stop, this number drops to 448. Generally, there were relatively few cases where respondents refused to participate or were unavailable (three to five percent of the overall target sample, except in the Gharb treatment group). The most common reasons for replacement in Haouz was that the owner of the target parcle had already been interviewed, which was likely caused by the smaller sample frame in Haouz. About 180 cases needed to be replaced because the owner lived too far from the collective and small portion of parcels needed to be replaced because they were mis-coded (for example the parcel was used for industrial or commercial purposes or in one case was the site of a mosque).

Table B.2. Reasons for replacing sampled target parcel, by region

	Gharb		Haouz	
	Control	Treatment	Control	Treatment
Cancelled at request of client or refused	19	239	n.a.	n.a.
Interviewed already (owns another parcel in collective)	7	9	46	82
Owner lives too far from collective	36	62	35	47
Parcel ineligible (wrong land use or status)	4	0	18	29
Respondent refused or unavailable to participate	n.a.	n.a.	28	26
Total replacement	66	310	127	184
Final sample size	813	783	811	805

Note: The data collector recorded respondent refusals together with the cases we had to abandon in Gharb. We use n.a. to account for the mismatch in categories.

Sample weights

We calculate weights for each target parcel that reflect the sample design. These are weights that are assigned to each unit and account for the different probabilities that a unit was sampled. These weights are used to adjust any statistical estimates to ensure that we report data that is representative of the parcels in each stratum. During our original sampling process, we calculated the probability of selection by

estimating the size of each stratum and used the target sample size to arrive at a probability of selection. However, due to the need to drop certain collectives and shift our sample to other areas, we revised our weights based on the final sample in each stratum.

B. Qualitative – Rural Land

The qualitative analysis for the Rural Land Activity is based on data collected from 38 key informant interviews (KIIs) and 40 focus group discussions (FGDs). Qualitative field work took place from February to March 2022 (February 28 to March 18 in Gharb, and March 1 to 24 in Haouz) and was led by the Groupement C&O Marketing / Chezeen. Two qualitative data collection teams were mobilized by region, with both male and female moderators and interviewers. Focus groups were conducted in meeting rooms at local *Caidat* or commune government offices, schools, and youth centers. COVID-19 safety precautions regarding social distancing and personal protective equipment were followed.

1. Qualitative instrument description

Key informant interview guides

Interviews were conducted with 38 key informants, including representatives of key government agencies, the *melkisation* and accompanying measures implementing organizations, and MCC and MCA-M, as well as local representatives of the project areas (both *caids* and *nouab*) (**Annex Table B.3**). The KIIs focused on gathering information from high-level stakeholders about how the optimized *melkisation* procedure was designed and implemented (including challenges and successes). The KII guides were all structured in a similar fashion. First, background on the evaluation objectives was provided to the respondent and informed consent was obtained. Next, the respondent was asked to provide background on their role with respect to the Rural Land Activity. Then, a series of questions were asked about each step of the optimized *melkisation* procedure with which the stakeholder was involved, including what worked well during the process, what challenges were faced, how long the step took, whether the process was inclusive or varied by geography, and how various stakeholders collaborated. Next, we asked about lessons learned regarding why certain ethnic collectives refused to participate in *melkisation*. Finally, we asked about anticipated impacts of the *melkisation* procedure on key outcomes of interest, including access to credit, land markets, tenure security, land conflict, and agricultural investments and productivity.

Table B.3. Baseline key informant interview stakeholders, sample, and area of focus

Organization	Stakeholder	Number	Area of focus
Cadastral Agency (ANCFCC)	Focal point for the Rural Land Activity	1	• Insights into land administration processes • Steps and challenges in the process of land registration • Frequency of and time required for land transactions • Perceptions of interministerial communication and coordination
Ministry of Interior (DAR)	Province Leads in Sidi Slimane, Kénitra, and El Kalâa des Sraghna	3	• Insights into *melkisation* processes, progress, challenges, delays, conflicts, etc. • Perceptions of interministerial communication and coordination
Ministry of Agriculture (MAPMDREF)	Head of the Agricultural Land Status Service and focal point of the Rural Land Activity	1	• Perceptions of interministerial communication and coordination
	Regional Agricultural Offices in Gharb (ORMVAG) and Haouz (ORMVAH)	2	• Insights into *melkisation* processes, progress, challenges, delays, conflicts, etc. • Perceptions of interministerial communication, coordination, and involvement
Implementer responsible for *melkisation* (NST)	Project Lead	1	• Insights into *melkisation* processes, progress, challenges, delays, conflicts, etc. • Consultants' roles in achieving outcomes • Challenges with developing list *of rightsholders,* process of *lotissement*, establishment of titles
Implementing partner – agricultural practices (ONCA)	Director of Agricultural Consulting Engineering; Regional Directors of ONCA (Gharb and Haouz)	3	• Contribution of accompanying measures (information campaign on improved agricultural practices) to project objectives
Implementing partner – functional literacy training (ANLCA)	Directeur	1	• Contribution of accompanying measures (functional literacy training) to project objectives
Banks and lenders	Local bank branch of GCAM in Gharb	1	• Willingness to accept land as collateral for loans
Project funder – Morocco (MCA-M)	Rural Land Activity Director; former GSI Director	2	• Insights into *melkisation* processes, progress, challenges, delays, conflicts, etc. • Deviations in implementation from original plans • Consultants' roles in achieving outcomes • Perceptions of interministerial communication and coordination
Project funder – United States (MCC)	Associate Director, Land and Agricultural Economics; former MCC RCD; MCC Land Director; MCC ESP Director; MCC GSI Director	5	• Insights into *melkisation* processes, progress, challenges, delays, conflicts, etc. • Deviations in implementation from original plans • Consultants' roles in achieving outcomes • Perceptions of interministerial communication and coordination

Organization	Stakeholder Number	Area of focus
Caids	6: 4 in Gharb (3 treatment and 1 control *caidat*) and 2 in Haouz (1 treatment and one control *caidat*)	• Process of (and risks related to) land allocation, tenure security, administration, conflict resolution prior to and after *melkisation* • Challenges with developing list of rightsholders, minimum-parcel size, *lotissement*
Local collective leaders: *nouab*	12: 8 in Gharb (4 treatment and 4 control collectives), 4 in Haouz (2 treatment and 2 control collectives)	• Process of (and risks related to) land allocation, tenure security, administration, conflict resolution prior to and after *melkisation* • Challenges with developing list of rightsholders, minimum-parcel size, *lotissement*

Focus group discussion guides

FGDs focused on understanding the baseline situation of key stakeholder groups, to assess qualitatively whether the Activity is addressing the needs identified by the population at baseline. Whereas the quantitative data collection focused primarily on male owner-operators of collective land parcels, the qualitative data collection also sought to collect data from various sub-groups: (1) female collectivists (rightsholders, spouses/heirs of rightsholders, and assignees); (2) collectivists who had recently benefited from a loan; (3) large landholders; (4) small landholders; (5) Renters / sharecroppers / tenant farmers; and (6) informal buyers (**Annex Table B.4.**). The definitions included in this table describe the criteria for participant recruitment in the FGDs, including the relationship of an agricultural plot operator with collective land (land tenure status) and gender.

Table B.4. Baseline focus group discussion participants, sample, and area of focus

Stakeholder type	Definition	Number	Area of focus
Collectivist farmers	Collectivists (members of ethnic collectives) who are farm operators and/or owners. This includes: rightsholders, heirs of rightsholders, and assignees. Both men and women.	12 (8 in Gharb, 4 in Haouz)	• Participation and consultation during *melkisation* process • Tenure security and land conflict before and after *melkisation* • Credit access before and after *melkisation* • Knowledge of legal rights process of *melkisation* • Participation in land sale and rental markets, and motivations • Changes to agricultural practices, input use, labor, and mechanized equipment • Intra-household decision making
Women collectivists	Female collectivists (members of ethnic collectives) including rightsholders, spouses/heirs of rightsholders, and assignees. The woman does not necessarily need to be a farm operator and/or owner.	8 (4 in Gharb, 4 in Haouz)	• Participation and consultation during *melkisation* process • Perceptions and experience of social norms around female land access, inheritance/ownership • Perceptions of and understanding of recent amendments to 1969 law governing rights of heirs (and other relevant *dahirs* which impact GSI). • Tenure security and land conflict before and after *melkisation* • Perceptions and experience of social norms around credit access for women • Intra-household decision making
Renters, sharecroppers, and tenant farmers	Tenant (man or woman) of the collective plot s/he cultivates. This can take the form of a rental (payment = cash amount or amount in kind) or sharecropping (payment = share of the proceeds from the farm) or tenancy (free use). Both men and women.	4 (2 in Gharb, 2 in Haouz)	• Participation in land sale and rental markets, and motivations • Tenure security and land conflict before and after *melkisation* • Land use and agricultural practices
Informal buyers	Someone who purchased a collective plot in an informal or illegal manner. This includes (1) "outsider" buyers who are non-collectivists; and (2) collectivist buyers who purchased a plot outside of their own ethnic collective.	4 (2 in Gharb, 2 in Haouz)	• Participation in land sale and rental markets, and motivations • Tenure security and land conflict before and after *melkisation* • Land use and agricultural practices

Stakeholder type	Definition	Number	Area of focus
Large landholders	Collectivist (member of an ethnic collective) whose overall farm size is greater than 7 hectares. These are large farm operations that are producing at scale and are likely to have lots of output and use capital-intensive methods. Both men and women.	4 (2 in Gharb, 2 in Haouz)	• Participation and consultation during *melkisation* process • Perceptions and social norms around youth land access, inheritance
Small landholders	Collectivist whose overall farm size is less than 0.5 hectare. These are very small farm operations that will not be eligible for *melkisation* unless regrouped with other parcels to meet the 5ha minimum requirement. Both men and women.	4 (2 in Gharb, 2 in Haouz)	• Tenure security and land conflict before and after *melkisation* • Credit access before and after *melkisation* • Participation in land sale and rental markets, and motivations
Recent loan recipients	Collectivist who has applied for a loan in the last three years. Both men and women.	4 (2 in Gharb, 2 in Haouz)	• Credit access before and after *melkisation* • Participation in land sale and rental markets, and motivations

In **Annex Figure B.3** below, we provide a schematic to describe the line of questioning that was used during FGD participant recruitment to verify land tenure status. Annex **Table B.4.** presents additional key term definitions that supported with the qualitative data collection. Each of these terms and definitions have been reviewed and approved by MCA-M.

Figure B.3. Schematic to describe the line of questioning to verify land tenure status

To understand the relationship of an agricultural plot operator with collective land, the first question to ask is : are they a collectivist (member of the ethnic collective) ?

If the response is no, the person is called an outsider or non-collectivist;

If yes, and the person's name is published in the list of rightsholders in the Official Bulletin, they are a "rightsholder";

If yes, and the person's name is not published in the list of rightsholders in the Official Bulletin, they are an "assignee".

Pour comprendre la relation d'un agriculteur exploitant d'une parcelle agricole collective, la première question à poser est : est-ce qu'il est collectiviste (membre de la CE) ?

- *Si la réponse est « non » la personne est dite « tiers » ou « étranger a la CE »;*
- *Si « oui » et il est publié dans la liste au Bulletin Officiel (BO) c'est un « ayant droit (AD) » ;*

Si « oui » et il n'est pas publié à la liste des ayants droit au BO il est dit « attributaire ».

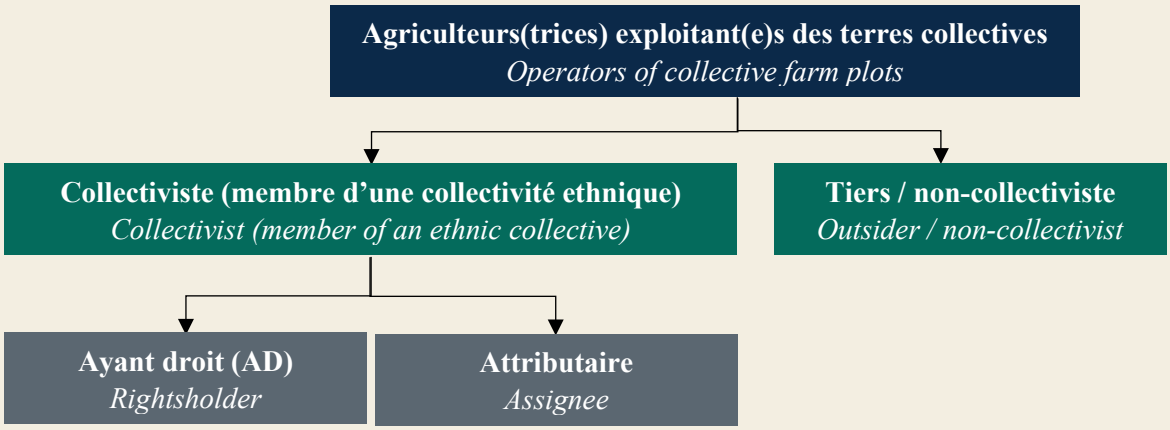


Table B.5. Key term definitions for Rural Land Activity qualitative data collection

Français	English
Assiette foncière (AF) : Espace physique défini par les normes cadastrales d'un territoire pouvant faire l'objet d'immatriculation foncière.	**Collective land "mother" title:** a physical property defined by cadastral standards as subject to land registration.
Attributaire: un collectiviste (membre de la collectivité ethnique (CE) bénéficiaire d'une parcelle lors du partage de la terre collective dont le nom n'est pas inscrit sur la liste au Bulletin Officiel, mais reconnu par la collectivité ethnique.	**Assignee / presumed members of the ethnic collective:** presumed member of the Ethnic Community who already has a plot designated/assigned to them (recognized) by the collective, but whose name is not on the list in the Official Bulletin.
Ayant-droit (AD): un collectiviste (membre de la collectivité ethnique (CE)) détenant un droit potentiel sur une assiette foncière (AF) de la CE situé dans les périmètres d'irrigation. Cette qualité d'AD est conditionnée par la publication sur les listes d'AD qui ne concernent que les AF dans les périmètres d'irrigation. La catégorie des héritiers des AD est assimilée à la catégorie des AD.	**Rightsholder:** A rightsholder is a collectivist (member of an ethnic community) located within an irrigated perimeter, who holds a potential right to a collective land "mother title" of that ethnic community, and whose name is published in the list of rightsholders in the Official Bulletin. This definition of a rightsholder only concerns properties in irrigated perimeters.
Liste des ayants droit : Liste des personnes considérées comme ayant un droit de jouissance sur une terre collective. Pour avoir une valeur juridique opposable, cette liste doit être publiée au Bulletin Officiel.	**List of rights holders:** List of people considered to have a right to collective land. To have enforceable legal value, this list must be published in the Official Bulletin.
Caïd : agent d'autorité représentant le ministère de l'Intérieur. Il représente l'autorité locale pour toutes les affaires courantes du district et « assure l'exécution des lois et règlements, le maintien de l'ordre, la sécurité et la tranquillité publique et y dirige les services de l'État, placés sous son égide » (Dahir n° 1-56-047 du 20 mars 1956).	**Caïd:** a senior state official (Minister of Home Affairs) who represents the local authority for all current affairs of the district and "ensures the execution of laws and regulations, the maintenance of order, security and public tranquility and directs the State services there, placed under his authority" (*Dahir* n ° 1-56-047 of March 20, 1956).
Collectiviste : membre de la collectivité ethnique (CE) qui a un droit de jouissance sur le patrimoine de la CE exploité en commun selon les pratiques coutumières et la règlementation en vigueur.	**Collectivist:** member of the ethnic collective who has a (collective) right of use on the heritage of the ethnic collectivity jointly exploited according to customary practices and the regulations in force.
Collectivité ethnique (CE) : personne morale constituée de personnes se réclamant d'une même ascendance et qui considère avoir en commun une terre, une histoire, une culture et un mode de vie.	**Ethnic communities:** a legal entity made up of multiple people claiming the same ancestry and a common land, history, culture, and way of life.
Copropriété (parts divisés): régime juridique selon lequel plusieurs personnes sont titulaires d'un droit de propriété d'un même bien, dans ce cas, une même parcelle ou un même lot. Le bien concerné est divisé en parts spécifiées, où le(s) propriétaire(s) de chaque part a (ont) le droit d'effectuer des transactions sans le consentement des autres actionnaires. Des conditions supplémentaires peuvent être associées à chaque action concernant ces parts.	**Co-ownership (divided shares):** legal regime according to which several people are holders of a right of ownership of the same good, in this case, the same plot or the same sub-plot. The good is divided into specified units, where the owner (s) of each unit has (have) the right to transact without the consent of the other shareholders. Additional conditions may be associated with each action relating to these shares.
Indivision : situation dans laquelle plusieurs personnes sont titulaires d'un droit de jouissance sur un bien dont les quotes-parts sont définies ou non. Le droit à la parcelle est indivisé et chaque usager dispose d'un droit sur l'ensemble du bien (assiette foncière/parcelle). Toute action ou transaction foncière sur le bien doit recevoir l'aval de l'ensemble des parties titulaires du droit de jouissance.	**Joint ownership (undivided shares):** situation in which several people are holders of a right of use property whose divided shares are defined or not. The right to the plot is undivided and each user has a right to the entire property (collective land "mother title" / plot). Any action or land transaction on the property must be approved by all the parties holding the right of use.
Exploitant: personne chargée de prendre les décisions agricoles concernant la parcelle et de mettre en valeur celle-ci (choix de culture, utilisation des intrants, pratiques agricoles, etc.)	**Operator:** person responsible for making agricultural decisions about the plot (for example, decisions about crop choice, input use, farming practices, etc.)
Lot: espace composé de plusieurs parcelles, d'une superficie totale au moins égale à 5 Ha.	**Lot:** area composed of multiple plots, with a total area of at least 5 hectares.
Agence Millennium Challenge Account –Maroc : institution publique chargée de la mise en œuvre du Compact II.	**Millennium Challenge Account –Morocco agency (MCA-M) :** public institution in charge of implementing the compact II.

Français	English
Melk : terme Marocain pour désigner la propriété privée.	**Melk:** Moroccan term for private property.
Melkisation : opération consistant à passer de la propriété d'une collectivité ethnique en indivision à une propriété individuelle privée par ayant droit.	***Melkisation*:** a process of converting land from joint ownership by an ethnic collective to individual private ownership by a rightsholder.
Ménage: groupe de personnes qui vivent habituellement ensemble sous le même toit et ont en commun des dépenses alimentaires, vestimentaires et autres. Toute personne qui a vécu pendant au moins 6 mois dans le ménage ou a l'intention de s'établir dans le ménage est considérée comme un membre du ménage.	**Household:** A group of people who usually live together under the same roof and have common expenses for food and clothing, for example. Anyone who has lived for at least 6 months in the household or intends to live in the household is considered a member of the household.
Naïb/Nouab : personne élue par les membres de la collectivité ethnique pour la représenter et gérer en son nom les affaires courantes concernant la gestion des terres collectives. La désignation du naïb se fait selon une procédure de validation du ministère de l'Intérieur.	***Nayb/Nouab***: person elected by the members of the ethnic community to represent it and manage on its behalf the day-to-day affairs of collective land management. The designation of the *naib* is done according to a validation procedure of the Ministry of the Interior.
NST (NOVEC-SAFTOP-TAOUHID) : groupement attributaire du marché chargé de l'appui technique et social à l'opération de melkisation de MCC/MCA-M.	**NST (NOVEC-SAFTOP-TAOUHID) :** firm selected by MCA-M to implement the improved *melkisation* project.
Parcelle: Une parcelle agricole est un espace géographique délimitée (levée), exploitée par un bénéficiaire, qui peut faire tout ou partie d'une exploitation agricole. Elle est limitée par des lignes de démarcation clairement visibles et identifiables (clôture, piste, seguia, etc.). La parcelle doit être d'un même tenant et avoir la même consistance, et elle se caractérise par un statut juridique et un mode de faire valoir spécifiques. Cette parcelle, même portant parfois un bâtiment, sera totalement concernée par la melkisation. Sur le plan évaluation agricole de l'Activité Foncier Rural, la superficie du bâtiment, quand il existe, devrait être déduite de la superficie de la parcelle pour ne considérer que la partie cultivée/exploitée et, l'étroitesse de certaines parcelles est une réalité de terrain au niveau de beaucoup de CE.	**Plot:** An agricultural plot is delimited geographical space or piece of land that is a part of the farm, operated by a farmer. It is limited by clearly visible and identifiable demarcation lines (fence, track, seguia, etc.) The plot must be in one piece (contiguous), and it should be characterized by a specific legal status and tenure. The entire area of the plot, even if it contains a building, is eligible for *melkisation*. In terms of the agricultural evaluation of the Morocco Land Productivity Activity, the area of the building (when it exists) should be deducted from the area of the plot to consider only the cultivated part. Many plots in ethnic collectives are very small/narrow as a result.
Parcelle cible : parcelle du terrain collectif qui fait l'objet de cette étude. Pour le groupe de traitement, ce sera la parcelle qui bénéficie de l'opération de melkisation. Pour le groupe témoin, ce sera une parcelle d'une collectivité ethnique qui n'a pas bénéficié de l'opération de melkisation. L'enquêteur disposera des coordonnées GPS de la parcelle cible, ainsi que des informations de base pré-remplies, issues du recensement national agricole (RNA) ainsi que de l'enquête menée par le prestataire chargé de l'opération de melkisation (NST).	**Target plot :** the plot of collective land which is the subject of this study. For the treatment group, this will be the plot of land which is part of the *melkisation* program. For the control group, this will be a plot of collective land from an ethnic collective that is not participating in the *melkisation* program. The enumerator will have the GPS coordinates for the target plot, as well as basic pre-filled information, from the agricultural census (RNA), as well as from the survey conducted by the implementer of *melkisation* (NST).
Périmètre d'irrigation : Territoire à usage agricole sur lequel est aménagé une infrastructure d'irrigation. Les terres collectives situées en totalité ou en partie dans un périmètre d'irrigation sont régies par le Dahir de 1969 adopté dans le cadre du Code des investissements agricoles qui promeut le développement de l'agriculture comme un des piliers fondamentaux de la politique nationale de développement économique et social et définit les avantages offerts par l'Etat aux agriculteurs.	**Irrigated Perimeter :** Agricultural land on which an irrigation infrastructure is built. Collective lands located in whole or in part in an irrigated perimeter are governed by the *Dahir* of 1969 adopted within the framework of the Agricultural Investment Code which promotes the development of agriculture as one of the fundamental pillars of the national economic and social development policy, and defines the advantages offered by the State to farmers.
Propriétaire : personne (ou personnes) chargée(s) de prendre les décisions sur l'usage, la vente et le transfert de la parcelle	**Owner** : the person/people responsible for making decisions on the use, sale, and transfer of the plot)
Propriétaire-exploitant: la ou les personne(s) qui est à la fois propriétaire et exploitant d'une parcelle de terrain. La parcelle est à la fois détenue et exploitée par la même personne ou par le même ménage.	**Owner-operator:** the person/people who are both the de facto owner and operator/farmer of a plot of land. The plot is both owned and operated by the same person or the same household.

Français	English
Femmes Soulalyates : terme médiatique désignant les femmes ayants droit (publiées ou non) et membres de collectivités ethniques, y compris les héritiers et les conjointes des ayants droit.	***Soulalyates***: media term designating women beneficiaries (published or not) and members of ethnic communities, including heirs and spouses of rights holders.
Terres collectives : Terres qui appartiennent en pleine propriété à une ou plusieurs collectivités ethniques.	**Collective land:** Land which belongs in full ownership to one or more ethnic communities.
Titre foncier : Document qui garantit, sécurise et protège le droit de propriété. Le titre foncier a un caractère définitif, irrévocable et inattaquable. La personne ou les personnes qui y sont inscrites sont reconnues comme uniques propriétaires du terrain ou de l'immeuble concerné.	**Land title:** Document which guarantees, secures, and protects the right to property. The land title is final, irrevocable, and unassailable. The person or persons registered therein are recognized as the sole owners of the land or building concerned.

2. Qualitative sampling and participant recruitment

Our qualitative sample, based on the selection criteria described below, is presented in Litke-Farzaneh (2022) – we refrain from identifying collectives and *caidats* in this report to respect respondent anonymity. For our local KIIs and FGDs, we employed theory-based, criterion sampling at the commune and ethnic collective levels, using criteria that are most relevant to our research questions (and which cover the dimensions we think might lead to different explanations)[74]. We prioritized these criteria such that our sample size will still result in saturation, which is the point when further data produce little or no new information.[75] This is the most efficient use of resources to maximize learning. Note that while we were able to use these criteria to select treatment collectives for Gharb and Haouz (and to match control collectives for Haouz), our selection of control collectives in Gharb is limited to geography and size, since we were unable to obtain a complete dataset from ORMVAG.[76]

- **Geography (region and province).** We have purposively selected six communes across each of the regions and provinces in which the optimized *melkisation* program operates: four communes in Gharb region (one in Kenitra, two in Sidi Slimane, and one in Sidi Kacem provinces) and two communes in Haouz region (both in El Kelaa province, the only province involved in the program in this region.[77]

[74] Palinkas, L. A., S. M. Horwitz, C.A. Green, J.P. Wisdom, N. Duan, and K. Hoagwood. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. Administration and Policy in Mental Health, 42(5), 533–544.

Patton, M. Q. (1990). Qualitative evaluation and research methods (2nd ed.). Sage Publications, Inc.

[75] Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., ... & Jinks, C. (2018). Saturation in qualitative research: exploring its conceptualization and operationalization. Quality & quantity, 52(4), 1893-1907.

[76] For the treatment group in both Gharb and Haouz, we rely on shapefiles and Excel data provided by NST on the state of advancement of the *melkisation* procedure, which includes the number of rightsholders and the area of each collective, the date of establishment of the list of rightsholders, and the level of advancement in the improved *melkisation* process (Appendix 2. Etat d'Avancement 2021). For the control group, we were provided with ORMVAH shapefiles for all potential control collectives in Haouz, but we received incomplete ORMVAG shapefiles for potential control collectives in Gharb. In response, we manually digitized shapefiles for additional potential control collectives in Gharb, using a PDF image from ORMVAG. As a result, while we are able to select control collectives in Gharb based on size and area, we lack additional data on these collectives to improve our matching (name of collective, number of plots / rightsholders per collective, or the date of establishment of the rightsholder lists). We will collect this data for our sample during the *nouab/caid* interviews and adjust our sampling subsequently as necessary.

[77] Our quantitative farmer survey sample is split evenly across Gharb and Haouz, but our qualitative data collection will draw richer insights if we sample from each of the four provinces where the program is operating, sampling

Within those six communes, we selected at least one treatment collective and one control collective,[78] for a total of twelve collectives from which to sample farmers (for FGDs) and *nouab/caids* (for KIIs). We sampled from each of the four provinces in order to capture geographic diversity and to reflect differences in administration, types of crops, and proximity to big cities (e.g. Kenitra, vs. Sidi Kacem).

- **Size of ethnic collective (area in hectares, number of plots and/or number of rightsholders).** Within each province, we selected some ethnic collectives (treatment and control) that are relatively smaller (with a smaller area and fewer rightsholders/plots) and some that are relatively larger. This allowed us to assess how the potential for success, sustainability, and scale-up of *melkisation* vary based on size of the ethnic collective (related to RQ7, about how and why the project's benefits and costs accrue differently to different groups). However, we also selected collectives that are large enough to obtain a sufficient sample of farmers and other local stakeholders.
- **Level of advancement in the improved *melkisation* process (treatment collectives only).** We selected at least one commune each in Gharb and Haouz where the *melkisation* procedure was relatively more nascent/less advanced (to establish a baseline), and one commune where the procedure was relatively more advanced (to gain an understanding of whether activities were implemented as planned, related to RQ1, and early implementation challenges and successes, related to RQ2).
- **Acceptance/refusal to participate.**[79] Related to the level of advancement in the improved *melkisation* process, certain ethnic collectives in the provinces of Kenitra and Sidi Slimane refused to participate in the optimized *melkisation* procedure. While we considered including some of these collectives in our qualitative sample, we ultimately did not sample these collectives due to concern from MCC and MCA-M about respondent burden and refusal. However, we discussed these collectives with MCA-M and NST during our KIIs, to understand the barriers/obstacles these collectives faced (RQ2), their perspectives on the *melkisation* process and why they elected not to participate.
- **Date of establishment of list of rightsholders.** Our sample includes both (a) treatment collectives where the rightsholder list was developed after the July 2018 adoption of the optimized *melkisation* procedure which requires awareness/info campaign reaching women and vulnerable groups; and (b) treatment and control collectives where the rightsholder lists were published prior to the Project and the optimized procedure. Including these two groups enables us to understand the effectiveness of the optimized procedure in ensuring inclusion of women in establishing the rightsholder list (RQ7).

more heavily from communes with more collectives participating in the program. This is a departure from the evaluation design report, which proposed splitting the qualitative sample evenly between Gharb and Haouz.

[78] Note that some collectives span multiple communes (especially the larger collectives in Haouz), and in some communes there were not both treatment and control collectives. In the latter case, we first identified the treatment collective for our sample, and then identified a nearby control collective, even if it was not in the same commune.

[79] This criterion draws on a list provided to Mathematica by MCC.

- For **key stakeholder** interviews, respondents from each organization/agency were selected purposively, based on their role or experience, selecting the staff member who is most knowledgeable regarding each aspect of the implementation. We sought support from MCA-M to identify the appropriate and relevant contacts for each KII and to facilitate interviews.

For our **local KIIs and FGDs**, the data collector began by travelling to the selected treatment collectives to conduct interviews with local collective leaders (***nouab*** **and** ***caids***).

- *Treatment collectives:* we began by conducting *nouab* and *caid* KIIs in treatment collectives, because we had more data and identifying information about them for recruitment than we did for the control collectives. We received lists of treatment ethnic collectives from MCA-M, as well as shapefiles for these collectives. These provided us with helpful identifying information for recruitment, including the name of the collective, the number of rightsholders, and the MCA ID and land requisition number. The names and contact information for each *caid* were collected in the interviews with the provincial representatives of the Ministry of Interior (DAR), and the names and contact information for each *nayb* were collected from the *caids*. These interviews helped us to gain buy-in and support recruitment for subsequent focus group discussions. We also used this as an opportunity to ask for additional identifying information about neighboring control collectives, to assist with recruitment there.
- *Control collectives:* For the control group, we only received a partial shapefile of collectives, and this did not include any of the above identifying information. As such, we had to rely solely on the geographic location of the control collectives for recruitment. The data collector showed the *nouab/caid* in a treatment collective a map of the neighboring control collective in which we intended to collect data, and asked for additional identifying information about that collective, so that we could begin recruitment there subsequently.

For recruitment of collective **farmers** for our FGDs in both the treatment groups, we asked the local *nouab* to help us identify and recruit all appropriate participants, since we did not have sufficient data to draw an initial list of proposed participants.[80] We purposively selected potential FGD participants based on the definitions of each stakeholder group, and the category of land tenure status described above.

C. Quantitative and qualitative – Industrial Land

The baseline study relies on a combination of quantitative and qualitative data. The former come from a zone-level database, developed by MIC, that sheds light on key zone-level characteristics. Data extracted from remote sensing imagery complement these zone-level administrative statistics. The qualitative data consist of key-informant interviews (KIIs) conducted with relevant stakeholders.

1. Quantitative

The performance evaluation aims to draw on a mix of administrative and remotely sensed secondary data (Table III.1). First, the evaluation will use MIC's zone-level database to understand zone-wide changes over time. As of December 2022, this database includes information on the gross area, available area, occupancy rate, identity of the zone manager, and type of zone management for 150 industrial zones

[80] The only farmer-level data source we have for the control group is the last agricultural census (RNA) in 2015, and this dataset does not have sufficient information to identify the participants for our focus groups. While we could use NST baseline data to support farmer recruitment for the treatment collectives, we think it will be more efficient to ask the nouab to help with recruitment in each case.

throughout the country. This baseline report uses these data for two purposes: (1) to identify a set of benchmark zones that may serve as useful comparisons for compact-supported zones over the longer term, and (2) to shed light on baseline land utilization patterns in compact-supported zones. The endline report will present results from longer-term trends analyses considering additional zone-level indicators in both compact-supported and benchmark zones.

Table B.6. Performance evaluation quantitative data sources, key outcomes, and current status

Data source	Outcomes and definitions	Coverage	Frequency	Current status
Industrial zone database (MIC)	• Land utilization rate (as proxied by share of lots sold and share of lots developed) • Zone gross area (ha) • Number of newly proposed, developed, or expanded industrial zones (as listed in industrial zone database)	Industrial zones with partial or complete support from MIC in their creation and/or ongoing operations	Irregular—less than annual	• Data for 2015 acquired from http://www.zonesindustrielles.ma/ for zone benchmarking analysis to inform selection of benchmark (non-demonstration) zones and respective managers for baseline KIIs • Data from additional rounds to be acquired in upcoming years as available via https://industrial-estate.gov.ma/
Remote sensing imagery (for example, Google Earth Engine)	• Economic activity (as proxied by nighttime luminosity) • Built-up area (based on relative shares of vegetation and built-up infrastructure in the zone)	Global	Monthly composite (VIIRS); every 5 days (Sentinel-2 optical)	• Data covering 2013–2019 (VIIRS) and 2015–2019 (Sentinel-2 optical) acquired to assess baseline trends in nighttime luminosity and NDVI, respectively • Data acquisition and analyses for future years will use remote sensing algorithms developed for baseline analyses.

Notes: KIIs = Key-informant interviews. MIC = Ministère de l'Industrie et du Commerce. VIIRS = Visible Infrared Imaging Radiometer Suite. NDVI = Normalized Difference Vegetation Index.

Remotely sensed data from two satellite programs will complement the insights emerging from MIC's zone-level database. First, the 10-meter resolution Sentinel-2 constellation of satellites offers daytime optical imagery with a five-day revisit time. Sentinel-2 data are commonly used for monitoring vegetation and have spectral bands that can be used for detecting built-up surfaces, such as building roofs. Next, we use nighttime lights data from the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor as a proxy for local economic activity and growth. VIIRS data are of lower spatial resolution, at 15 arc-seconds (~450 meters), but the zones are large enough that each will comprise multiple VIIRS pixels. Radiance data from the sensor measure total luminosity, which we will track over time. Use of remotely sensed data provides an independent measure of zone performance that allows us to triangulate qualitative findings and track changes over time without carrying out costly primary data collection (potentially yielding relatively imprecise recall data from zone-level managers or lot occupants) or reviews of administrative records.

2. Qualitative

After the EDR was approved in June 2020, Mathematica conducted KIIs with 21 stakeholders across 10 different respondent types between Q2 and Q4 of 2021 to inform this baseline report. These interviews inquired about zone management, development, and maintenance while remaining cognizant that stakeholders' responsibilities varied across those dimensions (see Table B.7 for additional information on

the types of stakeholders and topics covered by the KIIs). These interviews aimed to establish a baseline that shed light on the early stages of the industrial land legal reform process and improved zone operations, documented the experience of establishing the CEILD and incorporation of the PPP transaction advisor, and represented the pre-intervention experiences and perceptions of zone managers and firms located within zones.

Table B.7. Overview of baseline key informant interview stakeholders and areas of focus

Stakeholder type*	Areas of focus	Number of completed baseline interviews
Zone managers of demonstration sites	• Availability, reliability, and quality of social and business services • Changes in infrastructure connectivity	2[a]
FONZID grantees	• Efficacy of FONZID support • Experience with innovative governance and operating practices	6[b]
Benchmark (non-demonstration) zone developers, managers, and/or tenant/firm association presidents	• Legal, political, and financial dimensions of zone development and rehabilitation • Zone maintenance requirements • Investment returns • Perceptions of the quality of newly available industrial zone land • Obstacles to expansion and/or upgrading	1
Presidents of tenant/firm associations	• Quality of and satisfaction with zone-level services and infrastructure • Firm-level barriers to relocation and/or expansion	6[b]
Morocco land market experts (for example, academics, analysts, consultants)	• Availability of information on land pricing and availability • Perceived suitability and quality of available industrial land • Determinants of and impediments to relocation and/or expansion	2
Ministry of Industry (MIC)	• Data collection and data quality procedures • Involvement in new zone planning and development	2
Ministry of Interior	• Permitting processes and regulatory compliance requirements • Legal concerns with updated land use zoning practices	1
CEILD, FONZID, and PPP transaction advisor	• Grants management and project tracking • Best practice examples of innovative practices • Zone- and firm-level TA requirements for operationalizing new practices	2
MCA-M and MCC	• Deviations in implementation from original plans • Consultants' roles in achieving outcomes • Perceptions of inter-ministerial communication and involvement	4

Stakeholder type*	Areas of focus	Number of completed baseline interviews
Investment promotion agency	• Total employment generated • Total capital inflows • Marketing and promotion approaches of demonstration zones • Perceived foreign investment demands	1

Notes: CEILD = Center of Expertise for Industrial Land Development; FONZID = Fonds des Zones Industrielles Durables; MIC = Ministère de l'Industrie et du Commerce; PPP = Public–Private Partnership.

*In accordance with the EDR, baseline interviews were not planned with (1) firms operating within demonstration zones and FONZID grantee zones; and (2) PPP investors.

[a]These interviews were conducted with presidents of the tenant/firm association for Bouznika and Had Soualem. Zone managers were not yet in place.

[b]The completed interviews with the FONZID grantees and presidents of tenant/firm associations are the same six interviews.

We conducted stakeholder selection for KIIs in close consultation with MCA-M and MCC. We also relied on the "snowball method," whereby interviewees provided recommendations regarding other stakeholders we should interview based on their experiences or pertinence to understanding relevant sectoral changes. The final sample of interviewees who participated in KIIs reflected the nested layers of stakeholders and actors operating within the sector, including managers responsible for zone operations, representatives of zones that received FONZID support, presidents of associations representing tenants or firms within zones, zone managers from zones not directly affected by the activity but potentially experiencing spillover effects, government agencies tasked with devising, creating and enforcing updated industrial land laws, and members of the project teams from MCC, MCA-M, CEILD and FONZID who oversee the entire activity. We use insights from KIIs to assess key outcomes at baseline. As appropriate, we also use qualitative insights to inform an assessment of implementation-related progress and challenges pertaining to the Industrial Land Activity.

Note that given the overlapping nature of stakeholders' roles, interviews with some respondents contributed to insights into multiple domains. Specifically, as shown in Table B.7, the six FONZID grantees selected to participate in baseline KIIs were also presidents of tenant/firm associations operating in their respective zones, which enabled them to also share insights on the perspectives of this latter type of respondent.

We will conduct endline data collection, following completion of the PPP, infrastructure, and ESP/geographic information system activities, in 2025–2026. This data collection effort will focus on evaluating whether long-term outcomes were achieved and stakeholders' views on the facilitators and barriers to project success.

In addition to the KIIs, we also reviewed a series of a series of key documents to inform our baseline analysis of the Industrial Land Activity, including:

- Annual *Rapports d'activité* published by MCA-M between 2018 and 2022
- FONZID timeline slide, 2019
- Demonstration zones timeline slide, 2019

- Environmental and Social Impact Assessments for the demonstration zones and a subset of FONZID zones published in 2020
- *État d'avancement des projets* presentations providing updates on the implementation status of various FONZID sites
- *Rapport d'Activité*, with updates on demonstration sites, FONZID, and TA sub-activity implementation, by CEILD, July 8, 2021
- *« Appui à la Conception et à la Mise en Place d'un Programme d'Assistance Technique et de Renforcement des Capacités Concernant le Foncier Industriel au Maroc »,* UNIDO presentation to the Monitoring Committee, January 27, 2022
- *« Réunion de la 13eme session du Conseil d'Orientation Stratégique : Agence MCA-Morocco »* MCA-M, December 12, 2022
- *« Rapport consolide de portefeuille de projects : Tâche 7 : Plan de supervision et de suivi incluant les outils et processus de gestion des projets sélectionnés, de supervision, de suivi et de reporting, et de gestion administrative et financière»*, FONZID, January 20, 2023
- *« Bilan des réalisations au niveau de la région Casablanca-Settat – réunion Wilaya de Casablanca »,* MCA-M, January 30, 2023
- *« Appui à la Conception et à la Mise en Place d'un Programme d'Assistance Technique et de Renforcement des Capacités Concernant le Foncier Industriel au Maroc »,* UNIDO presentation to the Monitoring Committee, February 23, 2023

We will request regular updates on any newly available documentation and reports submitted to MCC/MCA-M, with the intent that such information will help to refine questions asked of each stakeholder in subsequent rounds of KIIs while also providing insights on the extent to which the project was implemented as planned.

Annex C. Findings from Baseline Farmer Survey

The tables reported in Annex C report the data underlying the graphs and figures in the main body of the report.

Table C.1. Descriptive statistics of sampled households

Indicator	Haouz Treatment	Gharb Treatment
Household head's age (mean)	59.1	59.5
Household head is female (%)	3.7	5.6
Household head is married (%)	91.3	90.1
Number of household members (mean)	6.74	7.06
Number of children 18 or younger in household (mean)	2.42	2.22
Head of household's education level		
None (%)	42.3	46.62
Primary or below (%)	41.8	40.41
More than primary (%)	15.5	12.82
Household head can read and write (%)	50	48.44
Female head or spouse can read and write (%)	3.5	2
Work		
Household head worked on the family farm (%)	74.7	90.2
Household head worked for a salary or in-kind payment (%)	23	12.6
Household head worked in a non-agricultural business belong to the household (%)	19.51	8.6
Spouse worked on the family farm (%)	24.8	28.08
Spouse worked for a salary or in-kind payment (%)	2.1	1.64
Spouse worked in a non-agricultural business belonging to the household (%)	2.3	.6
Household participated in ag. functional literacy training (ANLCA or ONCA) (%)	20.1	10.2
Household participated in financial literacy training (Credit Agricole) (%)	5.1	9.2
Self-reported area of target parcel (mean ha)	1.67	1.68
Area of target parcel (mean ha)	1.44	1.66
Target parcel has access to irrigation source (%)	70.1	58
Target parcel is irrigated (%)	43	52.4
Area of household holdings in ag. land, self-reported (mean ha)	7.55	4.16
Area of household holdings in ag. land, corrected (mean ha)	6.2	4.06
Household owns a productive agricultural asset (%)	82.06	67.3
Household has grid electricity (%)	96.9	98
Household has a potable water source (%)	84.1	41
N	805	813

Source: Farmer survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. The self-reported area of parcels was top and bottom coded at the 1st and 99th percentile. The corrected area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 ha. The predicted area was then top and bottom coded at the 1st and 99th percentile.

Table C.2. Access to credit

Indicator	Haouz Treatment	Gharb Treatment
Applied for loan with value of 25,000 MAD in last 3 years (%)	5	3.3
Household used collateral to secure a loan (%)	55	79.1
Household uses melk land as collateral for a loan (%)	41.4	34
Household applied to loan for any agricultural purpose (%)	68.1	73.5
Any loan applications (over 25k) approved in the last 3 years (%)	34.3	70.7
Total amount of loans approved	35062.38	57046.77
No need for money, don't like going into debt, or don't want to risk warranty (%)	64	55.1
Don't like going into debt (%)	49.6	33.8
No need to borrow money (%)	15.3	13.9
Don't want to risk warranty (%)	8.1	9.2
Constrained (no lender/hard to apply/missing documents/insufficient income) (%)	38.3	47.9
Believes lender would not grant loan due to insufficient collateral (%)	14.8	13.8
Believes lender would not grant loan due to insufficient income (%)	10.7	6.2
Missing documents or documents required for the application (%)	9.5	15.8
Too hard to apply (%)	8.9	13
No access to a lender (%)	7.3	9.6
N	805	813

Source: Farmer Survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. Twenty households reported submitting multiple applications or having multiple loans approved. Variables reported here are equal to 1 if at least one approved loan or application meets the criteria. The loan amount approved has been top and bottom coded at the 1st and 99th percentile.

Table C.3. Land tenure security and conflict

Indicator	Haouz Treatment	Gharb Treatment
Type of owner		
Household is published rightsholder (%)	88.5	75.2
Household is collectivist owner but not published rightsholder (%)	9.2	24.4
Household is non-collectivist (%)	2.3	0.5
Tenure security		
Owner has documentation showing right to use land (%)	89.5	86.8
Main respondent is named on the document showing the right to use target parcel (%)	95.5	89.4
Spouse is named on the document showing the right to use target parcel (%)	0.6	0.3
Others are named on the document showing the right to use target parcel (%)	34	24
Probability of losing right to use TP in 5 years (1=Not at all; 5=Extremely) (mean)	1.07	1.26
Melkisation status of target parcel		
Melkization project not started in this community (%)	0.5	4.2
Awareness campaign (%)	1.1	19
Establishment of the list of rights holders; processing of complaints (%)	0.9	8.2
Demarcation and survey of individual plots (%)	19.8	26.3
Allotment (%)	77.5	41.6
Reception of melk titles (%)	0.2	0.7
Conflicts		
Target parcel was subject to conflict in last 5 years (%)	3.6	4.7
Probability target parcel conflict in next 5 years (1=Not at all; 5=Extremely) (mean)	1.04	1.26
N	805	813

Source: Farmer Survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes because of missing values. We report responses from the main respondent only. The most common forms of documentation (more than 10%) showing the right to use land include an operating certificate, the published list of rightsholders, a waiver or withdrawal, or a receipt of participation in NST survey. Other forms of documentation include an inheritance deed, a legalized contract, a purchase deed, a certificate of customary ownership, or a transaction deed. Less than 1 percent of respondents said they have a parcel division plan, a Moulkiya act, a building permit, a land title, electricity bills, a receipt from ANCFCC, or a lease contract.

Table C.4. Awareness and knowledge of inheritance laws and rights to sell land

Indicator	Farmer survey		Spouse survey	
	Haouz Treatment	Gharb Treatment	Haouz Treatment	Gharb Treatment
Correct understanding of right to sell collective land (%)	12.2	55.3		
Subjective perception that women owners can buy or sell land (%)	94	57.2	91.7	48
Aware of inheritance laws (%)	46.1	45.7	33.2	30.8
Correct understanding of new inheritance law (%)	94.9	83.4	95.8	81.9
Correct understanding of right to sell *melk* land (%)	99.6	96.8		
N	805	813	805	813

Source: Farmer survey and spouse survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. The column "Farmer survey" represents responses from the main respondent, and the column "Spouse survey" represents responses from the spouse. We code respondents as having the "correct understanding of right to sell collective land" if they answer "No" to "According to your understanding of the property laws in Morocco, can owners of collective land sell the land?" Respondents have the "correct understanding of new inheritance law" if they answer "Half of the brother's share" to the question "Based on your understanding of the new law, if a rightsholder dies and has one son and one daughter, what share will the daughter inherit?" Respondents who answer "Yes" to "According to your understanding of the property laws in Morocco, can owners of *melk* land sell the land?" are coded as having the correct understanding of their right to sell *melkisation* land.

Table C.5. Cultivation patterns, crop choice and access to irrigation

Indicator	Haouz Treatment	Gharb Treatment
Target parcel level		
Area of parcel (mean ha)	1.44	1.66
Target parcel is cultivated (%)	73.6	95.3
Parcel has access to irrigation source (%)	70.1	58
Parcel is irrigated in 2022 season (%)	43	52.4
Farm level: Cultivation of crop categories		
Operational size of farm (mean ha)	6.08	3.84
Farm cultivates wheat grain (%)	45	56.3
Farm cultivates non-wheat grain (%)	21	24.1
Farm cultivates olives (%)	95.8	8.5
Farm cultivates fruit (%)	9.8	14.5
Farm cultivates citrus (%)	0.3	5.7
Farm cultivates market garden crops (%)	3.9	15.7
Farm cultivates fodder (%)	20.9	34.5
Farm cultivates legumes (%)	2.4	32.2
Farm cultivates oilseed (%)	0	8.1
Farm level: Area of crop categories		
Percent of farm area used for wheat grain	14.6	31.3
Percent of farm area used for non-wheat grain	4.3	7.9
Percent of farm area used for olives	46.9	3.5
Percent of farm area used for fruit	1.9	5.8
Percent of farm area used for citrus	0	3.2
Percent of farm area used for market garden crops	0.4	5
Percent of farm area used for fodder	2.6	13.4
Percent of farm area used for legume	0.3	11.6
Percent of farm area used for oilseed	0	2.9
N	805	813

Source: Farmer survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. The area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 hectares. The predicted area was then top and bottom coded at the 1st and 99th percentile. Crops are categorized using the 2016 RNA survey manual. Crop categories not shown are those with fewer than 2 percent of households cultivating and include almonds, dates, flowers, forestry, and industrial crops. We also do not show “other” crops because respondents were not asked to specify “other” crops. Percent of farm area used for each crop category is determined by first calculating the area of each parcel used for individual crops, then summing these areas for crops in the same category across all parcels, and finally dividing by the total farm area.

Table C.6. Agricultural input use: quantity and cost

Indicator	Haouz Treatment	Gharb Treatment
Input use		
Farm used irrigation (%)	64.3	60.6
Farm used hired equipment (%)	49.1	88.5
Household used any hired labor (%)	49.8	56.9
Household used any family labor (%)	86.3	94.6
Farm used animal traction (%)	8.1	16.7
Farm used improved seed (%)	16.2	25.3
Household used any chemical fertilizer on farm (%)	41	86.3
Household used any organic fertilizer on farm (%)	49.2	47.8
Quantity of inputs		
Quantity of family labor (mean days)	184.19	160.66
Quantity of hired labor (mean days)	97.46	62.71
Quantity of chemical fertilizer used on farm (mean kg)	167.82	759.8
Quantity of organic fertilizer used on farm (mean kg)	493.24	326
Expenditures		
Total farm input costs (mean MAD)	20,308	19,080
Cost of animal traction used on farm (mean MAD)	116	436
Cost of hired equipment used on farm (mean MAD)	1,244	2,900
Cost of hired labor used on farm (mean MAD)	7,625	4,552
Cost of improved seeds used on farm (mean MAD)	488	844
Cost of herbicides, chemical pesticides, or insecticides used on farm (mean MAD)	721	1,480
Cost of fertilizer used on farm (mean MAD)	3,377	6,861
Cost of irrigation used on farm (mean MAD)	6,738	2,008
N	805	813

Source: Farmer survey

Note: Sample sizes shown are for the largest sample, but some variables could have smaller sample sizes because of missing values. Data on input quantity and costs are collected at the farm level and unconditional on using the input. The quantity and cost of each input is top and bottom coded at the 1st and 99th percentile. These costs are then summed for the total farm input costs.

Table C.7. Long-term investment (machinery, irrigation equipment, tree-crops)

Indicator	Haouz Treatment	Gharb Treatment
Number of productive fruit trees on the farm (mean)	95.4	62.62
Number of productive olive trees on the farm (mean)	380.3	14.81
Household owns a productive agricultural asset (%)	82.1	67.3
Household owns a combine harvester (%)	4.4	0.6
Household owns a commercial vehicle (%)	18	14.5
Household owns a drip irrigation system (%)	13	26.3
Household owns a fertilizer spreader (%)	1.1	3.1
Household owns a motor-pump (%)	43.9	52.1
Household owns a motorbike (%)	61.9	13
Household owns a pick-up truck (%)	4.2	4.8
Household owns a seeder (%)	0.7	4.5
Household owns a tractor (%)	12.6	18.1
Household owns a truck (%)	0.3	0.7
Household owns a van (%)	1.5	0.7
N	805	813

Source: Farmer survey

Note: Sample sizes shown are for the largest sample, but some variables could have smaller sample sizes because of missing values. The number of fruit and olive trees has not been top or bottom coded. Ownership of individual assets is unconditional on owning any productive assets, defined as any of the following: tractor, seeder, fertilizer spreader, combine harvester, motor pump, seeder, commercial vehicle, motorbike, pick-up truck, tractor truck, or van.

Table C.8. Table summarizing the gender composition and sample

Availability of spouse data	Male head of household (Treatment)	Female head of household (Treatment)
No spouse	76 (4.7%)	56 (3.5%)
Spouse not interviewed	201 (12.4%)	4 (0.2%)
Spouse not matched	43 (2.7%)	3 (0.2%)
Spouse identified	1225 (75.8%)	9 (0.6%)

Source: Farmer survey and spouse survey

Note: In this table, the percentages are over the entire sample, so all percentages add to 100. There are a variety of reasons why we do not have spouse survey data. First, a household may not have a spouse, second the spouse survey was not conducted due to refusal or because the spouse was not available, and finally, in limited cases data quality issues prevent us from correctly matching the principal respondent with their spouse.

Table C.9. Women's land rights and decision-making

Indicator	Haouz Treatment	Gharb Treatment
Farmer survey: Spouse is decision-maker on target parcel inheritance (%)	15.16	24.52
Farmer survey: Female spouse may hypothetically inherit target parcel (%)	90.37	85.23
Farmer survey: Daughter may hypothetically inherit target parcel (%)	86.25	91.24
Spouse survey: Spouse is decision-maker on target parcel inheritance (%)	28.06	43.33
Spouse survey: Spouse has the right to sell the target parcel (%)	4.93	8.57
Spouse survey: Spouse has the right to bequeath the target parcel (%)	18.01	21.1
Spouse survey: Spouse is named on the document showing the right to use the target parcel (%)	6.59	9.51
Spouse survey: Spouse is decision-maker on target parcel transactions, collateral, or inheritance (%)	30.85	43.48
Spouse survey: Spouse has input into target parcel transactions, collateral, or inheritance (%)	49.02	45.61
Spouse survey: Probability of losing right to use target parcel in 5 years (1=Not at all; 5: Extremely)	1.08	1.19
N	562	663

Source: Farmer survey and spouse survey

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. This table reflects answers provided by both the main respondent and spouse respondent. Indicators beginning "Spouse Survey" reflect answers provided by the spouse respondent whereas indicators beginning with "Farmer survey" reflect answers from the main respondent. Forms of documentation showing the right to use the target parcel are reported in figure II.3.

Annex D. Validating spatial regression discontinuity design

As discussed above and in the EDR, the primary advantage of an RD design in the context of evaluating the *melkisation* program is that our impact estimates can control for unobserved characteristics of the plots that might also be correlated with outcomes of interest. This approach has strong appeal because under certain assumptions parcels near the treatment boundary can be thought of as randomly assigned to either the treatment or control groups, thereby controlling for unobservable variation that also affects the outcomes of interest.

The EDR proposed implementing spatial regression discontinuity using the following steps. First, we proposed limiting our analysis to control and treatment parcels that fall within 1.5 kilometers of the treatment boundary (the area defined by collectives that are undergoing *melkisation*) – this bandwidth was selected based on an analysis of data from the agricultural census. Second, we would use spatial data on the relative distance between the parcel and the nearest boundary of a treated collective to create a distance measure that determines whether a parcel is treated (see EDR for further details). Finally, we would estimate the non-parametric relationship between an outcome of interest and the distance measure on either side of the boundary. By using baseline data, we can test the key assumptions behind this approach that parcels on either side of the distance function are similar before the collectives undergo *melkisation*. To do this, we use the impact regressions to test for zero impact in pre-intervention outcome measures and predetermined covariates.

The primary approach to validating an RD design with baseline data is to determine whether the running variable also determines variables that should not or could not have been affected by the treatment at the boundary. This is accomplished be running the regression model estimating impacts on variables that are either predetermined covariates (predetermined with respect to treatment) or placebo outcomes – that is, outcomes that should not be affected by the treatment. By using baseline data, we can test the key assumption that neighboring comparison collectives are, on average, similar before the collectives undergo *melkisation*. To do this, we would use the impact regressions to test for zero impact in pre-intervention outcome measures.

We estimate treatment effects using the following equation[81]:

$$Y = \alpha + \tau T + f(D) + T*g(D) + \epsilon,$$

$$\text{where} \quad C - h < D < C + h,$$
$$\text{and} \quad T=1 \text{ if } D < c.$$

T is an indicator for treatment that explains our baseline outcome Y, *D* is a measure of distance to the edge of the treatment boundary and *f*() and *g*() are nonparametric functions. *C* is defined as the cutoff value, which defines treatment for values of $D < C$ and control $D > C$. We set *D* to be negative for all treated parcels and *D* to be positive for all control parcels. The analysis is bounded by a bandwidth, *h*, such that the sample for analysis only includes parcels with a distance inside the bandwidth, $c - h < D < c + h$. *g*() and *f*() are functions that model the relationship between distance to the boundary and the

[81] We estimate the model using the Stata package RDROBUST. The package allows for data-driven bandwidth selection. We report results using both the 1.5 km bandwidth specified in the design report and also allow for data driven selection.

outcome of interest on either side of the treatment boundary. The treatment effect estimate is the average difference between treatment and control parcels, once this has been accounted for.

Because we are analyzing baseline data, we focus on assessing whether the proposed model for estimating impacts estimates an effect for predetermined covariates. (Note that this is like conducting a baseline balance test, just for the units around the cut-off). We select the following predetermined plot-level covariates that should be unrelated to distance to the boundary: year parcel acquired, irrigation and irrigation access, crop choice and cropping practices, whether the parcel is held in co- or joint- ownership, parcel area, ownership of productive assets, and household head age and education.

We report estimates of the RD estimator for predetermined baseline covariates for Gharb in Table X. Using the proposed 1.5-kilometer bandwidth, we find only one variable where there is a significant effect: an indicator for whether the target parcel is held in co- or joint-ownership. All other variables demonstrate no statistically significant difference around the boundary of the treatment area. The 1.5-kilometer bandwidth estimates the treatment effect using data from 571 treatment units. If we allow the structure of the data to determine the optimal size of the bandwidth[82], we find much smaller bandwidths which include as many as 467 treated observations and as few as 301. We find that there is a statistically significant effect at the boundary for whether the parcel cultivates fruit, whether the parcel is held in joint ownership, and the education level of the household heads. This suggests that certain variables, like the likelihood of a parcel being held in joint ownership are being driven by the boundary.

[82] The optimal choice of bandwidth is a tradeoff between a larger bandwidth, which increase precision by including more observations in the estimation of the RD effect, and a smaller bandwidth, which is more likely to support the identifying assumption that units on either side of the cut-off are essentially identical.

Table D.1. RD Estimates of predetermined covariates at baseline for Gharb

	RD estimator – 1.5 km bandwidth	p-value – 1.5 km bandwidth	RD estimator – optimal bandwidth	p-value – optimal bandwidth	Number of T	Number of C	Bandwidth (km)
Year the target parcel was acquired	-1.707	(0.596)	0.906	(0.811)	502	105	0.995
Parcel is irrigated in 2022 season	-0.0139	(0.873)	0.00646	(0.952)	462	88	0.747
Parcel is mono-cultured	0.0517	(0.459)	0.0315	(0.715)	447	87	0.743
Parcel cultivates fruit	-0.0721***	(5.55e-05)	-0.0536***	(0.00526)	442	85	0.736
Parcel cultivates wheat grain	0.153	(0.122)	0.148	(0.166)	576	128	1.249
Parcel held in co- or joint-ownership	-0.0977***	(0.00104)	-0.108***	(0.000278)	427	77	0.658
Area of parcel	-0.460***	(0.000930)	-0.0322	(0.884)	301	47	0.415
Parcel has irrigation access	0.00428	(0.960)	0.0345	(0.743)	477	93	0.806
Household owns a productive agricultural asset	0.185**	(0.0300)	0.172	(0.111)	519	98	0.881
Household head's age	-1.263	(0.593)	-2.081	(0.440)	585	119	1.126
Household head's education level: none	-0.186***	(0.00292)	-0.460***	(5.97e-09)	334	54	0.471

Note: RD estimates using a 1.5-kilometer bandwidth estimate the treatment effect using at most 571 treatment units and 236 control units. Optimal bandwidth selected using one common coverage error-rate optimal bandwidth as recommended in Cattaneo et al 2019. The number of included T and C units and the optimal bandwidth are reported in the last three columns.

We report estimates of the RD estimator for predetermined baseline covariates for Haouz in Table Y. Using the proposed 1.5-kilometer bandwidth, we find that there is a large and statistically significant effect on the size of the target parcel, the likelihood of growing olives on the target parcel and the likelihood of being held in joint ownership (similar to Gharb). All other variables demonstrate no statistically significant difference around the boundary of the treatment area. The 1.5-kilometer bandwidth estimates the treatment effect using data from 551 treatment units. If we allow the structure of the data to determine the optimal size of the bandwidth, we find much smaller bandwidths which include as many as 409 treated observations and as few as 240. Using the optimal bandwidth, we also find an effect for whether a parcel used irrigation. This suggests that the measure of distance to the boundary may also coincide with some other underlying features of the geography.

Table D.2. RD Estimates of predetermined covariates at baseline for Haouz

	RD estimator – 1.5 km bandwidth	p-value – 1.5 km bandwidth	RD estimator – optimal bandwidth	p-value – optimal bandwidth	Number of T	Number of C	Bandwidth (km)
Year the target parcel was acquired	1.872	(0.570)	3.087	(0.474)	284	48	0.726
Parcel is irrigated in 2022 season	-0.172	(0.105)	-0.233*	(0.0749)	382	72	0.924
Parcel is mono-cultured	0.0550	(0.579)	-0.0439	(0.731)	241	41	0.756
Parcel cultivates fruit	-0.0713	(0.143)	-0.0935	(0.113)	246	48	0.793
Parcel cultivates olives	0.110***	(0.00140)	0.105**	(0.0278)	266	57	0.870
Parcel cultivates wheat grain	0.0384	(0.702)	0.119	(0.353)	248	48	0.810
Parcel held in co- or joint-ownership	-0.160*	(0.0937)	-0.0614	(0.653)	319	49	0.746
Area of parcel	0.857*	(0.0758)	0.557	(0.318)	311	49	0.712
Parcel has irrigation access	0.112	(0.129)	0.118	(0.167)	409	84	1.020
Household owns a productive agricultural asset	0.0909	(0.314)	0.0327	(0.791)	340	59	0.822
Household head's age	3.244	(0.309)	2.873	(0.490)	356	63	0.858
Household head's education level: none	-0.0909	(0.411)	-0.0162	(0.911)	355	62	0.855

Note: RD estimates using a 1.5-kilometer bandwidth estimate the treatment effect using at most 550 treatment units and 177 control units. Optimal bandwidth selected using one common coverage error-rate optimal bandwidth as recommended in Cattaneo et al 2019. The number of included T and C units and the optimal bandwidth are reported in the last three columns.

Across both Gharb and Haouz we find some evidence that the boundary of the treatment determines parcel crop choices and rates of co- or joint ownership. While it is possible that the effect on co- or joint ownership is a result of the early stages of the *melkisation* program, the effect on crop choice may undermine the validity of the design. However, it is also possible given that we have conducted more than ten tests estimates that we are finding this result by chance.

Annex E. Validating parcel area and owner's legal status

A. Parcel area measurement

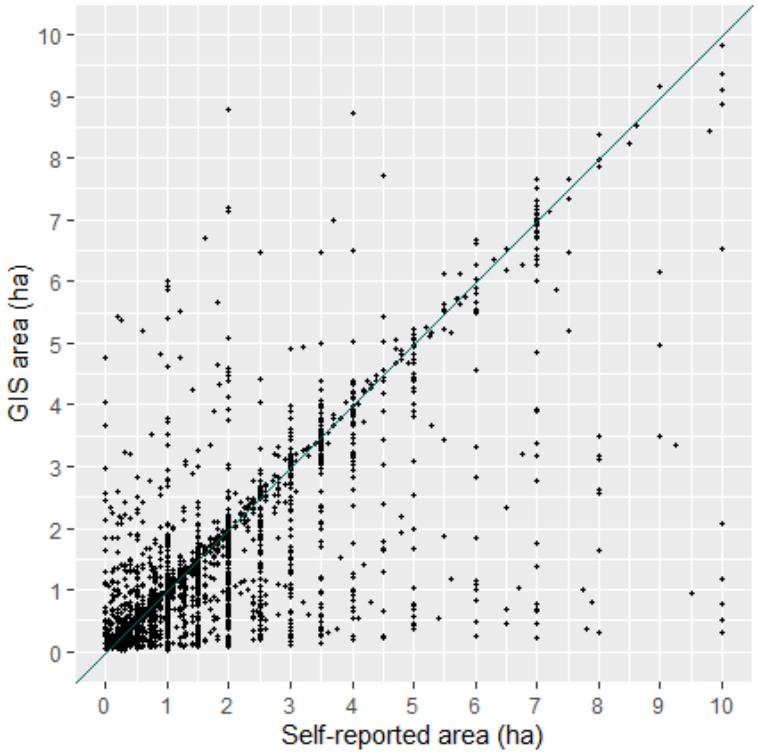
The household survey asked the principal respondent to estimate the area of all agricultural parcels owned or operated by the household. In addition, each sampled target parcel also collected one of two types of external GIS data on the parcel boundary: RNA data which dates to 2015 or data collected by NST as part of the implementation of the *melkisation* program. During the survey, respondents were asked to review the sampled target parcel boundary from either the RNA or NST data superimposed on a recent, high-resolution satellite imagery base map. Enumerators and respondents were asked to correct the outline of the parcel if it did not appear correct. Respondents were also asked to estimate the area of the sampled target parcel. As such, we have one parcel per household that has both GIS data and self-reported data, which we can use to assess the accuracy of self-reported data.

We use the GIS data on target parcels to update self-reported measures for target parcels and adjust self-reported measures of non-target parcels, which have no associated GIS data. Specifically, we use the sample of parcels with both GIS-based and self-reported area measurements to impute corrected area measurements for all parcels, based on the relationship between self-reported area and actual (GIS) area. The self-reported areas may require correcting for several reasons. First, data entry errors, such as incorrect units or input errors, can lead to inaccurate information and outliers. Second, respondents often report rounded areas, especially for larger parcels. Figure E.1 below compares self-reported area to GIS area of target parcels.

In line with other studies (for example Gourley et al 2019, and Carletto et al 2017), we find that self-reported areas tend to cluster around half or quarter hectares, especially as parcel sizes increase, and that self-reported areas are systematically biased across the range of GIS-based measures (see Figure E.1). We therefore use a regression-based approach to impute and correct area measurements for self-reported parcel areas between 0.05 and 10 hectares. We limit the modeling sample to parcels within this range so that abnormally large or small parcels do not disproportionately affect the predicted relationship between self-reported and GIS-based measures. When calculating the non-linear relationship between self-reported and GIS area measurements, we control for whether the self-reported area was rounded to 0.25, 0.5, 1, 1.5, or 2 hectares. These controls account for rounding bias of respondents. Using this relationship, we predict the area of all parcels, and finally top and bottom code the predicted area at the 99th and 1st percentile.

Table E.1 provides summary statistics of the self-reported area, the GIS area from the RNA and NST data (which was updated during data collection) and shows the improvement in the distribution of area measures following imputation. In general, the corrected area of large parcels has decreased from the self-reported estimate and small parcels have increased. This is largely due to the removal of outliers from the data, which results in a distribution of parcel size that is closer to the GIS-based measure. Additionally, while the average corrected area does not exactly match the average GIS area, it is generally closer to the GIS area than the self-reported area. One exception is for small parcels. According to the corrected area measurement, the smallest five percent of parcels are 0.22 hectares or less, while as according to the GIS area the fifth percentile is 0.12 hectares. This may be caused by farmers under-reporting the size of small parcels, and the fact that small parcels were bottom-coded at the first percentile.

Figure E.1. Self-reported area vs. GIS area of target parcels



Source: Farmer survey, RNA, and NST parcel survey

Note: The sample represents all target parcels across both regions, where both the self-reported and GIS area are 10 hectares or less. The GIS area represents the parcel boundary updated by the respondent and enumerator during data collection. The parcel boundaries that were reviewed by the respondent and enumerator were either generated as part of the NST parcel survey or as part of the RNA data collection if no NST data exists.

Table E.1. Self-reported area vs. GIS area vs. Corrected area of target parcels

Statistic	Self-reported area (ha)	GIS area (ha)	Corrected area (ha)
5th percentile	0.13	0.12	0.22
Median	1	0.77	0.91
95th percentile	5.6	4.8	4.01
Mean	4.36	1.5	1.4
n	3,211	3,211	3,211

Source: Farmer survey

Note: Sample includes 3211 target parcels for which we have both self-reported and GIS area from the RNA or NST data. GIS area comes from RNA and NST data, which were updated during the household survey. The area of parcels was predicted using the relationship between self-reported and GIS area among a sub-sample of parcels between .05 and 10 hectares. The predicted area was then top and bottom coded at the 1st and 99th percentile.

B. Legal status of respondents

Acquiring legal title through *melkisation* depends on the legal status of owner relative to the collective land, especially as it relates to whether an owner of land is a rightsholder or member of the ethnic

collective. The program logic relies on the idea that documented property rights will not only protect farmers' legal rights but will also improve perceived tenure security. One way we measure property rights in the farmer survey is through self-reported claims about whether the main respondent or a member of their household is: 1) named on the published list of rightsholders, 2) not named on the published list of rightsholders but is a collective member, or 3) a non-collectivist, informal owner. We also collect data on which documentation the household possesses that proves ownership of the target parcel. We compare these findings with the NST parcel and household survey data conducted at an early stage in the project, which measures the percentage of households that are published rightsholders, inheritors of a collectivist, or informal buyers (in addition to other categories).

The large majority of households in our sample self-report that they are on the published list of rightsholders for the target parcel. However, according to NST's social impact reports in Haouz (NST Nov. 2021) and Gharb (NST June 2022), which report the results of the household and parcel survey, fewer households are on the published list in Haouz and Gharb. This discrepancy could be caused by the nature of our sample and the timing of our data collection. Treatment households are already undergoing the process of *melkisation* and at the time of data collection are likely to be included on published lists of rightsholders, either as an individual or a group of heirs. At the same time, there are many informal buyers who report to us that they are rightsholders.. Lastly, response bias may lead respondents to report they are rightsholders rather than informal buyers if they believe it is the more socially accepted type of landowner.

Table E.2. Status as rightsholder according to farmer survey vs. NST

	Farmer survey		NST (all parcels)	
Indicator	Haouz Treatment	Gharb Treatment	Haouz	Gharb
Type of owner				
Published rightsholder(%)	88.5	75.2	33	57.7
Collectivist owner but not published ayant-droit (%)	9.2	24.4	65	37.9
Non-collectivist (%)	2.3	0.5	2	3.8
Document in possession of the household showing right to use target parcel				
HH has published list of rights-holders (%)	7.2	27.5		
HH has waiver or disclaimer (%)	22.6	2.2		
HH has receipt of participation in NST survey (%)	26.6	12.7		
HH has no documentation (%)	10.5	13.2		
N	805	813		

Source: Farmer survey, NST Nov. 2021, and NST June 2022

Note: Sample sizes shown are for the largest sample, but some variables may have smaller sample sizes due to missing values. The column "Farmer survey" reflects the percent of treated households in Gharb and Haouz that were interviewed for the Farmer Survey. The column "NST (all parcels)" reflect the percentages provided in the NST social impact reports (NST Nov. 2021, NST June 2022). In these reports, households are categorized as 1) living rightsholder, 2) heir to rightsholder, 3) non-rightsholder or collectivist purchaser, 4) operator claiming to be collective member, 5) renter or associate of the parcel, and 6) other. In order to compare categories across both samples, we combine "2) heir to rightsholder "and "4) operator claiming to be collective member" into the category "Collectivist owner but not published rightsholder ." We also combine "3) non-rightsholder purchaser" and "5) renter or associate of the parcel" into "Non-collectivist."

In addition to NST's social impact reports (NST Nov. 2021, NST June 2022), we received a data extract from NST, although we do not have information on whether it is the same sample as used for the social impact reports. However, with this data, we are able to match the NST data associated with a parcel to our

sample, allowing us to analyze whether sample composition effects explain why we observe so few non-collectivist owners. Tables E.3 and E.4 below compare the full NST sample to the sub-sample of NST households that match to our farmer survey. We find that the distribution of owner types is similar between the full NST data and the sub-sample corresponding to our sample, suggesting that non-collectivist landowner types are systematically being dropped from our sample.

Table E.3. Owner types among full NST sample and sub-sample matched to Farmer Survey in Haouz

Type of operator	Full NST sample	NST matched to Farmer Survey
Operator not published on the list of rightsholders	50	53.4
Operator published on the list of rightsholders	44.5	43.3
Third party operator (non- rightsholder and non-collectivist)	3.8	2.3
Collective	0	
Conflict	0.1	
Multiple types	1.5	1
N	12,984	736

Source: NST household and parcel survey data

Note: The column "Full NST sample" reflects the full sample of parcels provided by NST, with data on the characteristics of the operator included as an attribute. The column "NST matched to Farmer survey" reflects a subset of the NST sample that was matched to our Farmer Survey. "Multiple types" refers to parcels where multiple different types of operators were associated with the same parcel.

Table E.4. Owner types among full NST sample and sub-sample matched to Farmer Survey in Gharb

Type of operator	Full NST sample	NST matched to Farmer Survey
Published rightsholder	44.1	40.9
Heir to a collectivist or published rightsholder	31.5	36.8
Non-published rightsholder	14	10
Non-collectivist	8.9	10
Owned by entire collective	0.1	
Other de-facto operator	0.3	
Tenant operator (rent, sharecropping)	0.2	
Other	0.1	0.2
Multiple types	0.6	2.1
N	17,833	470

Source: NST household and parcel survey data

Note: The column "Full NST sample" reflects the full sample of parcels provided by NST, with data on the characteristics of the operator included as an attribute. The column "NST matched to Farmer survey" reflects a subset of the NST sample that was matched to our Farmer Survey. "Multiple types" refers to parcels where multiple different types of operators were associated with the same parcel.

Annex F. Literature Update

In 2019, as part of our Evaluation Design Report for the Land Productivity Project, we conducted a review of the literature relevant to the Rural Land Activity and Industrial Land Activity (Harris et al. 2020). We focused on documenting causal evidence related to the assumptions and linkages identified in activity program logics. In this chapter, we update the literature outlined in the previous report. For the Rural Land Activity, we summarize two recent meta-analyses on rural land titling programs and update the evidence on three key aspects of the program logic based on some recent studies. For the Industrial Land Activity, we provide a summary of our previous report and note the lack of new evidence.

A. Rural Land Activity

Land titling programs across countries and contexts aim to increase income and reduce poverty through a similar set of channels, by achieving one or more of the following objectives: bolster access to credit, encourage farm investment by reducing expropriation risk, foster efficient land markets, and reduce conflicts through establishing clear ownership of land. In Harris et al. (2020) we found a mixed evidence base for the impact of land titling programs on these theoretical objectives, with outcomes improving in some contexts but not others (described in more detail below). A recent meta-analysis, which includes research published since our previous literature review, continues to find a mixed evidence base. Singirankabo and Ertsen (2020) conducted a meta-analysis to explore the effect of land registration on the link between tenure security and greater investments leading to higher agricultural productivity. The authors find additional explanations for why the link is not well established, highlighting three key reasons: 1) most studies lack empirical evidence to establish causality, 2) land registration does not automatically imply tenure security - often land registration programs destabilized 'de facto' (or informal) tenure security, even leading to insecurity of tenure, and 3) formalizing land tenure does not automatically translate into greater tenure security for women, and whether women benefit from holding a formal land title depends on the social, political, and economic context in which land formalization occurs. Tseng et al. (2020) conducted another meta-analysis, exploring the additional dimension of environmental outcomes, as well as socio-economic well-being related to tenure security. The authors find that on average enhanced land tenure security was associated with positive human well-being and conservation outcomes, even if the effects were not universal. Below, we describe in more detail any updates from papers cited in these two meta-analyses, regarding our key outcomes of interest.

Our initial review found that evidence on the impact of land titling on **access to credit** was limited, and that several factors contribute to the absence of measurable impacts on credit use including underdeveloped credit markets, or a lack of interest in credit among farmers at baseline (Fenske 2011; Platteau 1996). More recently, Ali and Deininger (2022) found the impacts of titling on credit access are lower for large farms than for small ones, due to factors such as the legal value of land documents issued; how recent the documents are and the quality of information they contain; and the cost of foreclosing on properties pledged as security for defaulting loans.

Land titling programs can improve **allocative efficiency in land markets** (allocation of resources to the most productive use) compared to land regimes where ownership rights are not firmly established. Our previous review showed the different pathways by which land reforms, and thereby greater tenure security can vitalize sales and rental markets and correct misallocation of resources (Deininger et al. 2017, 2011; Macours et al. 2010). Agyei-Holmes et al. (2020) recently used a regression discontinuity to show how land titling can improve allocative efficiency in peri-urban Ghana. Results showed that one key

channel through which secure land rights can improve smallholders' welfare is through gains in allocative efficiency of productive resources. As a result of secure land rights, smallholders could shift their use of land and labor away from agricultural production and into non-farm enterprises since households no longer had to use their land to protect their land rights. This greater security led to an increase in land transfers from households who preferred to use their time in nonagricultural activities.

Administrative obstacles to sales, such as high transaction fees, can also undermine the effectiveness of land titling programs. Ali et al. (2021) used data from a survey of 100 randomly selected villages in Rwanda to analyze the state of **land market activity** following a major titling program. The analysis point towards a very active land sales market and highlight that, largely due to high fees, many transfers are not formally registered despite having formal titles, raising the risk of a return to informality. Beyond eliminating the scope for better land management and more effective and efficient service provision via modern technology, this could also re-open a rural-urban divide and undo advances in terms of gender equality made possible by land tenure regularization. The study concludes that given landowners' willingness to pay for registration, lowering the flat fees to affordable levels could help to enhance compliance and raise income enough to maintain the registry system.

Over the course of the MCC Morocco Compact II's execution, new land laws in Morocco related to gender and inheritance of collective land were passed. As a result, the compact became more focused on taking advantage of opportunities to strengthen **women's land rights** and access to and control of land. Improving tenure security for women may look different than for men because of the cultural context, or relative empowerment of women in the agricultural sector. Likewise, any impacts may be mediated by gender as well (i.e. the program logic may apply differently). Meinzen-Dick et al. (2019) summarizes the many ways that gender affects the outcomes of land titling program on poverty and investments, although rigorous evidence on women's land rights and its effects continues to be in the nascent stages. The authors find there is strong agreement in the literature on the relationship between women's land rights and access to credit, technology adoption, and agricultural productivity, although the empirical evidence is limited. The study also demonstrates a strong association between women's tenure security and bargaining power and decision-making on consumption, human capital investment, and intergenerational transfers.

B. Industrial Land Activity

We reviewed the literature on industrial zones and their impact and effectiveness in the EDR (Harris et al. 2020) and found very little causal evidence. Much of the existing literature is based on research designs that lack appropriate control groups (due partly to the nature of the intervention), and fails to provide rigorous findings of impacts. There is also limited availability of data on Industrial Zone (IZ) performance for the Middle East and North Africa, and Africa generally. A few studies reported strong positive effects of IZs (such as Chinese SEZs), but in the presence of substantial exogenous factors such as fiscal policy reforms, limiting external validity of those findings. Lastly, much of the evidence is outdated. Further details of our findings can be found in the EDR (Harris et al. 2020). As part of writing this report, we conducted another search for recent literature to establish whether any new evidence exists and did not find any new evidence that overcomes the limitations noted above.

The existing literature on the effect of IZs on employment is mixed, with some studies finding a wage premium relative to informal sector, greater labor productivity, and positive effect on labor participation while other studies did not (Cirera and Lakshman 2017, Rand et al. 2019). Net employment does increase when zones are export-oriented and existing firms supply the domestic market (Farole and Akinci 2011;

Aggarwal 2007). In Morocco's context, given a moderate surplus of labor, net employment generation due to IZs is more plausible. The existing literature on private investments is sparse, and primarily looks at foreign direct investments (FDIs) - an avenue unlikely to generate investments for the Moroccan IZs, given there are no fiscal or trade incentives offered. We did not find literature to inform domestic private investments in IZs. The Industrial Land Activity in Morocco is aiming to increase the supply of land for industrial production and provide incentives to locate in IZs. Current studies are inconclusive on the effects of such incentives as a determinant of firm location due to data constraints (Arauzo-Carod et al. 2010).

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