The Impact of Land Property Rights Interventions on Agricultural Productivity in Developing Countries: A Systematic Review

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PROTOCOL

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THE CAMPBELL COLLABORATION

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1 Background

1.1 DESCRIPTION OF THE PROBLEM

Secure and predictable access to land as a productive resource is key to the livelihoods of millions of farmers around the world. Secure land rights enable farmers to invest in long-term improvements to farms and soils in the expectation that they will reap the benefits of those investments without fear that their land will be confiscated arbitrarily. Investments in improvements to soil fertility, and capital improvements such as irrigation equipment and fences, pay for themselves over multiple cropping seasons. Recent research on the use and management of common pool resources, such as forests and grazing lands, shows that ecological and livelihood outcomes are greater where local user groups have clear and secure rights to the resource; the right to exclude ineligible users often emerges as decisive to local communities' ability to manage their natural resources sustainably (see especially Persha, et.al [2010] and Porter-Bolland, et.al [2011]). A recent meta-analysis has also suggested that natural forests are better managed under community ownership rather than state ownership, because a greater share of the benefits of good forest stewardship accrue directly to local communities (ibid.). Formal and informal land rights are therefore seen as keys to improving the conditions of the poor in developing countries in terms of economic growth; agricultural production; food security; natural resource management; gender-related inequalities; conflict management and local governance processes more generally.

Many farmers in developing countries hold customary rights that are considered highly secure in the context of local social arrangements, but which are not accorded legal status in the country's statutory property regimes. Rather, land assigned under customary arrangements is statutorily categorized as public land, and subject to the stewardship and administration of public agencies. These areas of public land have been the principal targets of large-scale acquisition of land, or so-called "land-grabbing," in many developing countries. In the process, the customary tenure arrangements that delivered secure tenure rights to generations of farming families have been over-ridden and thousands of farming families face displacement. An appropriate policy remedy may be to accord extant customary arrangements statutory status equal to that accorded land held under public land and freehold tenures (Knight, 2010; United Nations, 2012). The land-grabbing problem

underscores the connection between clear statutory recognition of the land rights, whether they are based on customary rights or freehold rights, and tenure security.

Leading multilateral and bilateral development agencies accord high priority to policy reforms that strengthen tenure security, especially as elements of strategies to reduce poverty among women and other traditionally disadvantaged members of society. According to a 2003 World Bank study,

> "Providing secure tenure to land can improve the welfare of the poor, in particular, by enhancing the asset base of those, such as women, whose land rights are often neglected. At the same time, it creates the incentive needed for investment, a key element underlying sustainable growth." (Deininger, 2003, ix).

Other agencies, including USAID and FAO, have placed support for reforms promoting tenure security close to the centre of their funding strategies (see especially USAID and MCC [undated] and FAO [2011]). More about the historical and contextual understanding and success of land tenure interventions is discussed in section 1.4.

1.2 DESCRIPTION OF THE INTERVENTION

Land rights may include a wide range of rights to use, own and/or transfer land, as well as enforce rules and exclude outsiders. Strengthening of land rights can take a variety of forms that range from documenting customary uses to formalizing legal rights. Some forms may engage directly with the rights holder, for example through farm-by-farm land titling. Other forms of strengthening rights may act on a national level, for example constitutional reforms in Mozambique that recognize customary rights to land (van den Brink et al. 2006). National scale or even community level interventions that seek to strengthen rights may have differing impacts within populations, for example many interventions seeking to improve rights may lead to elite capture of benefits and subsequent loss of rights for poor and vulnerable sub-populations particularly in the absence of safeguards. The socially embedded nature of customary rights means land rights of many women depend on family relations that can be disrupted during interventions to strengthen rights resulting in men, but also women with greater status, exerting greater control over reform processes. Thus the observed impact depends on the type and scale of the assessment, across individuals, communities, regions and countries (Place and Swallow 2000).

The review will examine the specific impacts of two types of land rights interventions:

- Conversion of communal or non-demarcated rural land to freehold title and registration of such rights in an official registry. This kind of conversion has been a

standard approach, under the presumption that communal land tenure rights are inherently insecure. Such conversion typically consists of adjudicating and assigning land rights, physically surveying boundaries, and registering rights and boundary demarcations in an official land registry. Subsequent to this conversion, all transactions involving the land are intended to be recorded in the official registry.

- Statutory recognition and codification of customary or communal rural land rights, and registration of these rights in an official registry. This approach recognizes that communal systems need not be inherently insecure. Rather, it is based on the idea that these rights might be protected from arbitrary taking through statutory protection. In practice, such registration can be used to protect against the use of statutorily recognized freehold or public land tenure from the grabbing of communally-held land by outside interests. Such processes typically involve law reform, with examples including Botswana's Tribal Land Act of 1968, which extended statutory recognition to the traditional customary tenure system while replacing chiefs as land administrators with civil land boards. More recently, the Kenya National Land Policy of 2009 places customary land rights on equal legal par with freehold tenure and public land.

Informal processes may resemble what we have described above but without statutory backing– conversion and communal rights registration interventions constitute a very prominent class of interventions in this sector. Despite the value of these informal interventions, this review will focus on the affects of the added value of formal registration of land rights. This decision was taken for the practical reason that effects of informal practices are less likely to be robustly and rigorously measurable and comparable, and because formal interventions are more relevant for development projects aiming to introduce and replicate effective interventions transparently and accountably.

We exclude from the review related justice interventions (e.g., paralegal, outreach, alternative dispute resolution interventions, etc.) and enforcement capacity interventions (e.g., training of justice sector actors, digital boundary marking, etc.). Land inheritance reforms are also excluded.[1] Relevant moderating factors and mechanisms/intermediate outcomes for these interventions are likely different, and analyzing them would require separate theories of change and literature searches. Associated with this exclusion, it should also be noted that we expect to find that many interventions relevant to this study will constitute only one part of a bundle of mutually supportive interventions affecting tenure undertaken simultaneously in a given context, and that extracting specific effect sizes– and accordingly differentiating out the clear-cut success or failure– of specific interventions within such bundles may not be possible.

[1] Research has shown the adaptability of customary tenure to changing demographic patterns, including large-scale rural to urban migration by men, by accommodating new rules permitting the inheritance of customary land rights by widows (Lawry 1992). The availability of evidence on inheritance reforms suggests that this topic should be devoted to a systematic review in itself.

In our analysis, we will indicate whether or not interventions were carried out in isolation and if not, the other tools used will be identified and if studies include the information we will explain their perceived context specific roles in the qualitative section of the review. We will also suggest further work be done to review access-to-justice, enforcement, and other complementary interventions.

1.3 HOW THE INTERVENTION MIGHT WORK

A variety of factors are likely to influence effectiveness of land property rights interventions on productivity. Figure 1 presents the basic elements of a theory of change (causal chain) that draws on the research teams' own work in this area as well as the available literature (summarized below). The figure sketches out moderating factors, mechanisms of change and intermediate outcomes, and endpoint outcomes that we see as being important in understanding the effects of land property rights on productivity. The endpoint outcomes of interest include:

- Productivity of land use
- Welfare of pre-policy landholders, measured in terms of income and consumption, domestic violence, and gender equity.
- Welfare of post-policy landholders measured in the same way.

In theory, it is important to distinguish between the welfare of pre-policy and post-policy landholders in evaluating the welfare impacts of these interventions. To the extent that these groups differ, any analysis ought to incorporate the potential for adverse consequences for pre-policy landholders.

The theory of change proposes the following moderating factors as being important in determining the nature of the effects that are likely to follow land property rights interventions:

- Governance, including the nature of interests represented by those controlling policy.
- Social norms and practices, specifically ways in which gender, age, community standing, and other characteristics influence the other three moderating factors and individuals' ability interact with interventions in a particular social context.
- Land use, including population pressure on land, whether land is subject to mixed use (pastures and forests), as well as the types of cash crops grown, differentiated by prices and marketability.
- Markets, including the presence of credit markets and market demand for crops as well as demand for agricultural land, resulting from both local and international factors.

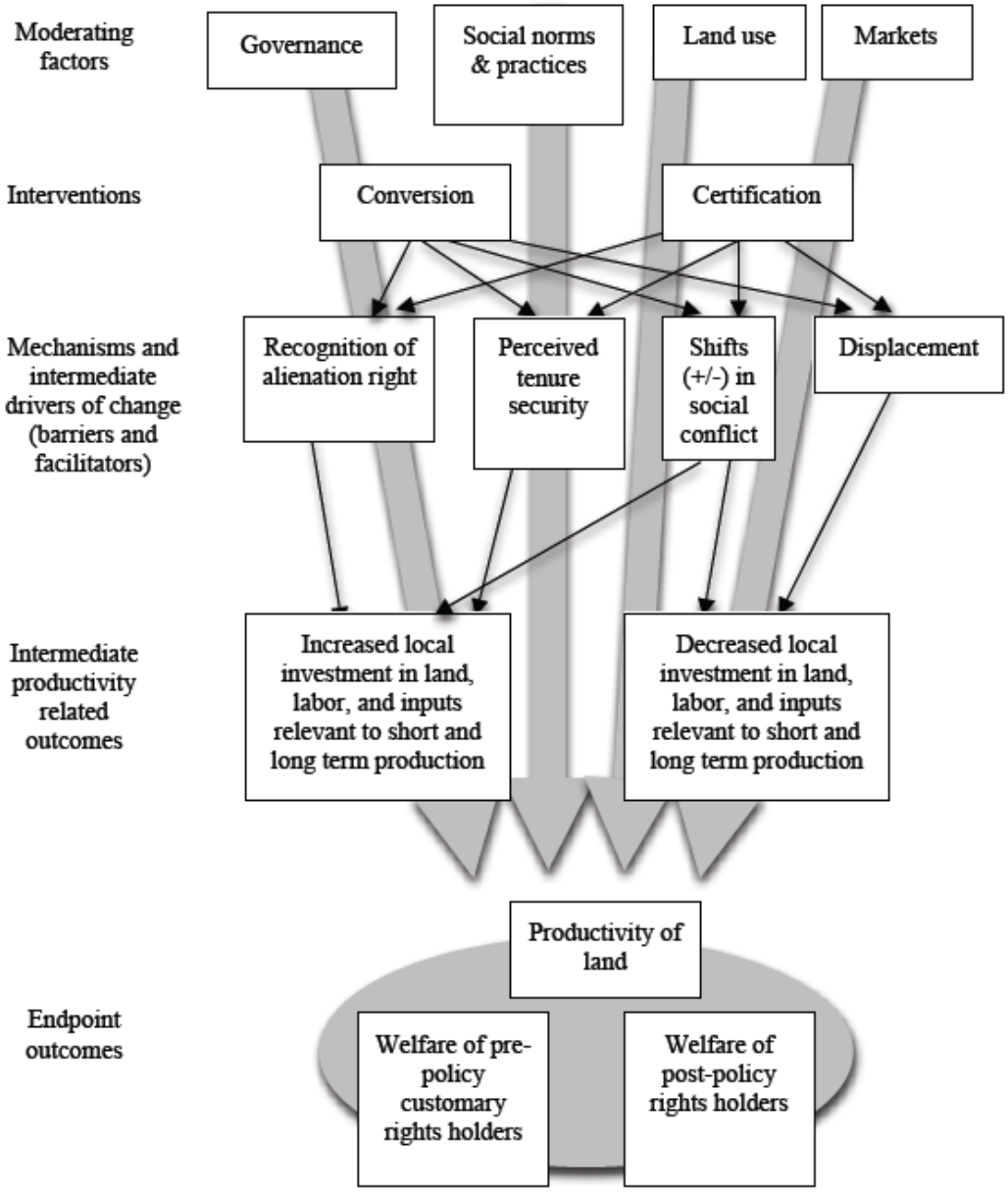
The theory of changes proposes that interventions and moderating factors operate through a number of intermediate drivers of change, including the following:

- Recognition of alienation right by those holding registered rights. This is presumed by conventional economic theory to provide collateral and, therefore, enable access to credit.
- Perceptions of tenure security, which is presumed by conventional economic theory to motivate investment of personal resources into production, investment
- Social conflict, including reducing amounts of land held in dispute and therefore not being used productively due to inheritance disputes, boundary demarcation disputes, or land use conflicts between, for instance, pastoralists and agriculturalists. At the same time, to the extent that such registration changes who has access to land, these interventions may indeed trigger violence or other forms of contention over these changes.
- Displacement of tenants whose rights to land are denied as a result of the intervention.

Intermediate outcomes include shifts in land, labor and agricultural inputs relevant to both short and longer term production. More specifically, these would include changes in:

- Investments of resources into short term production and land (fertilizer, pesticides, etc.)
- Investment of resources into longer term production and land (e.g., soil conservation, tree crops, etc.),
- Fuller employment of land through leasing-out or sharecropping.

Figure 1: Theory of Change



1.4 WHY IT IS IMPORTANT TO DO THIS REVIEW

Existing evidence on the effects of land property rights interventions is mixed and to a considerable degree dependent upon the initial land rights conditions. In many cases where existing rights are already secure through stable informal and customary systems, the formalization of rights through land titling, one form of strengthening rights, may have little impact (Pickney and Kimuyu 1994, Atwood 1990). In other cases, as in the Brazilian Amazonian frontier in the early 1990s, mechanisms for formalizing property rights, where no formal institutions had previously existed, are argued to have increased productivity and slowed forest loss (Alston et al. 1996). Alternatively, if strengthening land rights simply results in formalizing a bundle of overlapping rights customarily distributed through a community into private property, this "strengthening" could lead to the exclusion and marginalization of large sections of the community, including the poor, as is argued to have occurred alongside Kenyan tenure reform (Meinzen-Dick and Mwangi 2005). Thus it is important to understand to what extent the strengthening of rights in any context leads to new institutional realities and who bears the costs and benefits of changes in how land rights are assigned (Fort 2008, Bellemare 2010). As a result, a systematic review of these lessons would allow policy makers to define specific contexts and allow for consideration of likely success of a variety of potential land tenure interventions for women and men.

These inconsistent conclusions from studies on the relationship between strengthening rights and productivity have led academics and policy makers in recent years to try to investigate these differences (Brasselle et al. 2002). A literature review published by Dickerman et Al. (1989) on efforts to formalize and register customary land rights in Africa found that formalization had significant positive effects on investment and agricultural productivity in only a small number of particularistic contexts where customary systems had broken down or were absent. Rarely did the benefits associated with surveying land, adjudicating and assigning rights and maintaining official registers outweigh the costs. The authors suggested that registration in many settings had deleterious effects on the poor and on women farmers, particularly where women were not listed as joint title-holders.

Recent research on land certification programs in Ethiopia (Deininger, et. al. 2011) found that new low-cost survey and titling technology, along with growing demand for land and the opening of new markets, appear to result in higher net benefits in the form of agricultural productivity and farmer incomes. In the case of Rwanda's land tenure regularization program, access to land for married women appears to have improved in the short term (2.5 years after interventions), and investment in, and maintenance of, soil improvements increased as well, especially in female headed households (Ali, et. al. 2011). Other evidence suggests that titling, especially where it is an option in peri-urban settings, can be an effective pathway for

widowed, single and divorced women to purchase secure land rights not otherwise available to unmarried women under customary tenure.

These and other studies underscore the complexity of attribution and the importance of context (Place 2009) to understanding relationships between security, registration and productivity, and to understanding gender dimensions. They also suggest that tenure security alone is not the single factor 'silver bullet' leading directly to higher farmer incomes attributed to tenure reforms by writers such as Hernando de Soto (2000). Context matters, including whether markets and credit institutions are in place and input and other costs are at levels conducive to competitive pricing of agricultural products (Bruce, forthcoming). Relevant questions have recently been raised about the extent to which much of the available empirical research on the effects of tenure security has a handle on tenure security as a concept (Arnot, et. al, 2011).

To date, and with the exception of Porter-Bolland et.al (2011) which concerns forest management, the team is unaware of any systematic review or meta-analyses on the relationships between land property rights and productivity, or other outcomes. In addition, Fenske (2010) highlights study design limitations in many of the studies that have not found significant impacts of tenure security. The concerns about inconsistent effects and design limitations provide a strong motivation for a systematic review. Such a review might enable policy makers to better predict the outcomes of alternative interventions in particular social, economic and cultural contexts. In addition, our methods, which include both quantitative impact assessments as well as qualitative research, have been shown in the field of medicine to be useful for a variety of purposes, including: ensuring decision-makers have the most accurate evidence; assessing key population traits relating to a given intervention; establishing whether further primary research is required; and gaining new insights into relevant population or institutional traits (Ring et al 2011).

Finally, this review will be useful in that we plan to highlight areas in need of further assessment through rigorous impact evaluation and by providing guidance on how to make the most of evaluation opportunities.

2 Objective of the review

The objectives of the review are as follows:

1. to understand impacts of interventions to strengthen land property rights on agricultural and livelihood outcomes in rural areas of low and middle income countries;
2. to assess whether these effects are different for men and women, and under what circumstances;
3. to assess specific mechanisms that enable or limit productivity improvement (barriers and facilitators).

3 Methods

3.1 CRITERIA FOR INCLUDING STUDIES IN THE REVIEW [PICOS]

Although the literature on the relationship between property rights and productivity in developing countries is large, with theoretical and applied research dating to the 1960s, rigorous impact evaluations are not the norm. Initial searches found 12 studies that may meet the standards for our review (see Appendix I); 12 studies are quantitative effectiveness studies, while three are qualitative investigations).

3.1.1 **Participants**

We will include studies investigating smallholders and communities in rural farming systems in low- and middle-income developing countries. We will include only studies that have data disaggregated at least to the household level. Where studies permit disaggregation by gender, we will examine any differential impacts for women and men, and will include a section in the synthesis specifically addressing gender relevant results of our findings. We will also disaggregate effects by other sub-populations, including by social status and age . Finally, whenever possible, we distinguish between effects on pre- and post-policy landholders, and we will stratify our quantitative and qualitative analyses on these sub-populations when possible.

3.1.2 **Interventions**

The review will examine the impact of two types of land rights interventions:

1. Conversion of communal or non-demarcated land to free-hold and titling of such land.
2. Statutory recognition and codification of customary or communal land rights, and certification of these rights.

These interventions constitute a prominent class among land tenure interventions. We are excluding from the review other reforms, including those relating to justice, capacity-building, outreach, and inheritance.

3.1.3 **Comparisons**

We will include studies which compare farmers and communities where formal and informal activities to strengthen land rights have been implemented to control or comparison groups where these efforts have not been undertaken. Thus, the comparison conditions are the 'status quo' property rights situation prevailing in the absence of the intervention. As is always the case with evaluation of interventions in natural field settings, our comparisons will be between intervention settings and prevailing non-intervention conditions in terms of land tenure security. This implies a range of counterfactuals across studies, but should nonetheless provide a suitable benchmark against which to measure impacts within a given setting. In addition, we will address sources of baseline and effect heterogeneity in our analysis of effect moderation due to characteristics related to governance characteristics, social norms and practices, land use, and market conditions.

3.1.4 **Outcomes**

Based on the theory of change outlined above, we will examine outcomes that we classify as "endpoint" outcomes and "intermediate" outcomes. Endpoint outcomes will be the basis of our primary analysis, and intermediate outcomes will be the basis of secondary analysis as well as analysis of causal mechanism linking the interventions to the endpoint outcomes. Fostering or inhibiting this change are a number of drivers of change expected to impact the outcome of tenure interventions.

3.1.4.1 Final outcomes of interest include**:**

1. productivity of land use (measured in terms of market value of agricultural output)
2. income/consumption or poverty (measured in terms of standard consumption or income metrics), and
3. gender-based welfare outcome measures (measured in terms of variability in income/consumption or poverty by gender).

3.1.4.2 Intermediate outcomes of interest include:

1. Changes in investments of personal resources into production (measured in terms of market value of inputs),
2. investment in longer term production (e.g., tree crops), and

3. fuller employment of land through leasing-out or sharecropping.

Our assessment of impacts on final and intermediate outcomes will draw on evidence from quantitative effectiveness studies.

In order to assess mechanisms that enable or limit productivity improvement, we will seek measures on the following **drivers of change/mediators**:

Facilitator mediators:

1. Recognition of alienation right and associated use of land as collateral and access to credit.
2. Customary rights holders' perceptions of tenure security

Barrier mediators:

1. Social conflict and associated quantities of land held in dispute based in inheritance or boundary disputes, and violence or overt contention.
2. Displacement of pre-policy tenants.

Our assessment of the relevance of these drivers of change will come from both effectiveness studies as well as qualitative evidence.

3.1.5 **Study Types**

3.1.5.1 ***Study designs eligible for quantitative synthesis of effects***

We will use quantitative studies to assess impacts on intermediate and final outcomes. We will consider counterfactual studies that compare outcomes observed at the point of intervention to those in an appropriate second context.

Specifically, the review will synthesize quantitative evidence only from studies characterized by all of the following (See Appendix II):

1. (a.) Randomized experiments or (b.) quasi-experimental studies that employ strategies for causal identification with clearly delineated treated and control groups and use some method for removing biases due to non-random assignment of treatment, including, but not limited to, regression adjustment, difference-in-differences estimation, instrumental variables regression, fixed effects regression, regression discontinuity, matching, or inverse-propensity-weighted estimation. While application of such a method is sufficient for inclusion in our study, we appreciate that not all studies apply methods for causal identification with equal rigor.

Therefore, each of the included studies will also be assessed in terms of "risk of bias," as discussed below.

2. Studies that estimate the impact of either of the two interventions described above.
3. Studies that obtain measurement on at least one of the endpoint or intermediate outcomes described above.
4. Studies that estimate impacts with outcome data measured at the individual, household, or village/community level.
5. Studies undertaken in developing countries (as defined by the World Bank) and that measure outcomes at some point between 1980 and 2011.

*3.1.5.2 **Study designs eligible for qualitative synthesis***

While this review will use evidence gathered solely from experimental and quasi-experimental research to evaluate how interventions impact final and intermediate outcomes, it will also include results from a wider range of empirical research (including qualitative research) in order to, *inter alia*: assess factors contributing to the success or failure of interventions; identify how and why intended or unintended outcomes occur; understand the context in which un/successful interventions are carried out; elucidate the views beneficiaries have of the interventions; as well as more generally broaden the evidence base and understanding of evidence of intervention effectiveness and address effectiveness questions more specifically than might be otherwise possible (Spencer et al 2003 and Ring et al. 2011).

Eligibility of non-impact evaluation studies will be determined via a two-stage screening process to facilitate review of the most relevant studies while quickly filtering out inappropriate research based on the Critical Skills Appraisal Program (CASP) tool (Hannes 2010; Waddington et al. 2010). The first stage will screen out studies based on intervention, location, population, relevance to review questions, and study type (See Appendix IIIa). The second round of screening will focus on study quality based on frameworks outlined in Kuper et al. 2008, Spencer et al. 2003, and Waddington et al. 2010. Specifically this second round will filter studies based on clearly defined: research objectives; links to relevant literature; context and sample selection; data collection; methods; as well as quality and relevance of analysis (see Appendix IIIb).

*3.1.5.3 **Examples of studies included and excluded***

Appendix I provides a table of studies that we might consider under the quantitative and qualitative inclusion criteria. As an example of a study that would qualify under our quantitative inclusion criteria, consider the study by Ayalew et al. (2011). The intervention under study is Rwanda's National Land Tenure Regularization Program, which is an example of a conversion intervention in a developing country. The study examines impacts on various land-use investments at the household level, which contributes to our assessment of

intermediate outcomes at the appropriate level of analysis. Finally, the study employs a geographic regression discontinuity design, which satisfies our requirement for causal identification. An example of a study that does not qualify under our quantitative effectiveness criteria is the study by Goldstein and Udry (2008). In this case, despite the use of sophisticated econometrics and a focus on household-level land-use investments in a developing country (Ghana), the study does not explicitly estimate the impact of one of the two interventions described above and is hence, not eligible for inclusion. We also exclude studies based on cross-country regression methodology (e.g. Deininger and Squire, 1998).

3.2 SEARCH METHODS FOR IDENTIFICATION OF STUDIES

3.2.1 **Electronic searches**

We will include studies, and as far as is feasible, in all languages. Translation cooperation may also be requested in this regard. We will search the following online electronic databases from 1980:

- Agricola database
- ASSIA
- British Library for Development Studies
- CAB Abstracts (to be conducted by IDCG TSC)
- EconLit (to be conducted by IDCG TSC)
- Econpapers
- ELDIS
- FAO Gender & Land Rights Database
- Google Scholar (for both subject searches and citation searches of included studies)
- HeinOnline
- International Bibliography of Social Science (to be conducted by IDCG TSC)
- JOLIS
- Networked Digital Library of Theses and Dissertations
- OpenGrey
- PAIS
- Web of Science (for both subject searches and citation searches of included studies -to be conducted by IDCG TSC)

Our searches will be based on the key terms in the titles and abstracts, but will be supplemented by thesaurus terms used by individual databases, where appropriate, and by an LMICs filter (eg Cochrane EPOC LMICs filter) where search results warrant it.

1. land.ti,ab.
2. (tenure or right* or property right* or conversion or freehold* or titl* or codification or recognition or customary or certification).ti,ab.
3. (impact* or evaluat* or effect* or experiment* or trial or random* or quasi* or natural experiment* or discontinuity or fixed effect* or regression or difference in differences or instrumental variable* or matching or inverse propensity weight*).ti,ab.
4. (alienat* or collateral or credit* or secur* or conflict* or dispute* or violen* or displac*).ti,ab.

5. (qualitative or findings or interview* or themes or experience).ti,ab.
6. 1 AND 2 AND 3
7. 1 AND 2 AND 4 AND 5

In addition to the electronic database searches, we will search grey literature from the leading institutions working on land tenure, including the following back through 1980:

- University of Wisconsin Land Tenure Center
- International Land Coalition
- Think tanks such as PLAAS, AIAS, TEGEMEO Institute, ASARECA.
- Reports from key national donors such as USAID, DFID, GTZ/GIZ, AFD, USAID Land Tenure & Property Rights portal.
- Reports from international development organizations such as the CGIAR group, FAO, IIED, IFAD, and the World Bank.

These searches will be supplemented by contact with key authors in the field, bibliographic snowballing, and hand searches of key journals back through 1980, such as:

- African Development Review
- Agricultural Economics
- American Economic Journal: Applied Economics
- American Economic Review
- American Economic Review: Papers and Proceedings
- American Journal of Agricultural Economics
- Development in Practice
- Economic Development and Cultural Change
- Econometrica
- Economics and Politics
- Journal of African Economies
- Journal of Agrarian Change
- Journal of Development Effectiveness
- Journal of Development Studies
- Journal of Development Economics
- Journal of International Development
- Journal of Political Economy
- Journal of Public Economics
- Land Economics
- NBER Working Papers
- Proceedings of the National Academy of Sciences
- Oxford Economic Papers
- Quarterly Journal of Economics

- Review of Economics and Statistics
- World Bank Research Observer
- World Bank Economic Review
- World Development

3.3 DATA COLLECTION AND ANALYSIS

3.3.1 **Data extraction and management**

For studies meeting the inclusion criteria laid out in section 1.4 of this protocol, the following data will be extracted (adapted from Waddington, et al 2010). We appreciate that some quantified versions of the moderators are quite coarse, but we will draw out more refined interpretations of the relevance of the moderators in qualitative synthesis, in the manner that they are conceptualized in the theory of change.

General Information:	Authors, author affiliations, publication date, publication type
Quantitative inclusion criteria	Indicators for whether each of the five quantitative inclusion criteria are met (cf. Appendix II for coding)
Intervention:	Indicator for whether the study looks at conversion interventions, certification interventions, both, or as part of a larger bundle of interventions. Date of intervention. (cf. Appendix II for coding)
Study design:	Experimental, quasi-experimental, or qualitative. For quasi-experimental, the method used to address bias from non-random assignment. For quantitative studies, dates of data collection, unit of data collection (individual, household, community), numbers of treated and control units included in the analysis, numbers of treated and control units subject to the intervention. (cf. Appendix II for coding)
Context:	Year, country, region/province/area within country. (cf. Appendix II for coding)
Effects on intermediate outcomes	For quantitative studies, estimated effects on any of the intermediate outcomes listed above both in reported metric and converted to standardized metric discuss above. For all studies, quotes from the study on how the intervention seems to have affected any of the intermediate outcomes listed above

Effects on endpoint outcomes	For quantitative studies, estimated effects on any of the endpoint outcomes listed above both in reported metric and converted to standardized metric discuss above. For all studies, quotes from the study on how the intervention seems to have affected any of the endpoint outcomes listed above
Moderators	The theory of change outlined above also suggests that we collect data on the following moderators: 1. **Governance environment**, particularly concerning whether pre-policy tenant communities are well represented in institutions that control land rights policies. We will attempt to proxy this quantitatively using the Polity IV score for the year of the study 2. **Land use environment**, and specifically whether the land is mixed-use (e.g., pastoral/agricultural or forested land, and whether cash crop and subsistence farming co-reside) and the types of cash crops produced on the land. We will code studies according to whether land is subject to mixed use (pastures and forests), and whether cash crops are grown in the period and location of the study. We will also collect data on population density in the study area, or where not available, approximate this using the relevant country-period population density using the World Bank's *World Development Indicators*. 3. **Market context**, including access to credit markets and access to buyers' markets for cash crops. Market conditions will be measured quantitatively using the Financial Inclusion Index from the World Bank Global Findex 4. **Social norms and practices**, specifically ways in which gender, age, community standing, and other characteristics influence the other three moderating factors and individuals' ability to interact with interventions in a particular social context. We will attempt to proxy social norms and practices by geographical region. Quantitative measures of these moderates, as discussed

	above, will be obtained from auxiliary data sources and included in the meta-analysis dataset alongside the respective effect estimates.
Other qualitative information	Quotes from the study about other important moderators and their impact, intermediate or endpoint outcomes as well as impacts on these, or other comments addressing the adequacy of the theories of change described above.

3.3.2 **Assessment of risk of bias in included studies**

Quantitative effectiveness studies that meet our inclusion criteria will then be quality rated in terms of risk of bias in estimating impacts. Risk of bias will be assessed using the IDCG Risk of Bias Tool (March 2012 version). These quality rating methods are based on guidance from Higgins and Green (2011), Campbell Collaboration (2011), and Cochrane Effective Practice and Organization of Care Group (2009), suitably adapted to development interventions (e.g., accounting for the fact that blinding is nonsensical for interventions such as changes in land property rights). The quality ratings reflect the following domains:

1. Potential for selection bias due to non-random assignment, non-exogenous source of quasi-experimental variation in assignment, no adjustment for differences in baseline measurements,
2. Potential for spill-over, non-intervention based differences in treatment, or other types of interference across intervention and non-intervention units,
3. Selective outcome and analysis reporting based on systematic differences between reported and unreported findings,
4. Potential bias due to non-compliance, attrition, or otherwise missing data,
5. And other sources of bias.

For each study, a value of either “high risk of bias”, “low risk”, or “unclear risk” will be assigned for each of these five domains and support for judgment will be recorded. A summary judgment of the within-study risk of bias will be carried out using the criteria provided in Higgins and Green (2011, Table 8.7.a). These results will be recorded in a table that will be presented as part of the review.

3.3.3 **Assessment of statistical power of included studies**

Ex post power to detect standardized effects of low magnitude (0.2 standardized mean difference), moderate magnitude (0.5 standardized mean difference), and high magnitude

(0.8 standardized mean difference) will be determined based on the guidance of Campbell Collaboration (2011, 6).

3.3.4 Measures of treatment effect

Treatment effects will be measured as standardized mean differences (SMDs) for continuous outcomes and risk ratios (RRs) for binary outcomes, reported alongside 95% confidence intervals, computed as per the formulas provided by Campbell Collaboration (2011, Appendix 2). Where sufficient data do not exist to calculate SMDs, we will convert effects on continuous outcomes into response ratios, which use the same formulae as RRs. As per Campbell Collaboration (2011, 6-7) sub-group estimates will be aggregated using sample-weighted averages. (We will aggregate prior to meta-analysis only within each intervention-outcome group.) When multiple estimates are presented, the estimate that is deemed to have minimal risk of bias will be reported. Treatment effect estimates on comparable outcomes will be displayed together using forest plots.

3.3.5 Unit of analysis issues

When units of analysis are at a lower level of aggregation than assignment units, the review will follow the guidance of Campbell Collaboration (2011, 7-8) to adjust confidence intervals based on the intra-class correlation (ICC) adjustment to standard error estimates. Plausible ICC values will be derived from available development survey data.

3.3.6 Dealing with missing data and incomplete data

When studies are found to have missing data on outcomes due to attrition or other sources of non-response, an assessment of sensitivity of study conclusions to missing data will be made by (1) computing worst-case bounds on effect estimates and (2) providing discussion of possible directions of bias given the nature of the missing data. When studies do not report on endpoint or intermediate outcomes, the study authors will be contacted to determine whether such outcome data do in fact exist and so estimates could be produced. If so, we will seek to obtain effect estimates on these outcomes either from the study authors or using the raw study data to compute them directly.

3.4 DATA SYNTHESIS

3.4.1 Quantitative Synthesis

Synthesis of effect estimates from quantitative effectiveness studies

We anticipate considerable heterogeneity in the manner in which intermediate and endpoint outcomes are measured. Nonetheless, if comparable measures are used for impact estimates on any intermediate or endpoint outcome for a reasonable number of studies, we will carry out a synthesis that includes the following (Campbell Collaboration, 2011, 8-10; Rothman et al., 2008, 675-677):

- Assessment of overall heterogeneity using the I-squared statistic.
- Analysis of effects within subgroups by moderator variables as operationalized above, quality rating domain assessments defined above, and gender, when data are available to do so. We will also include a section dedicated specifically to gender relevant findings of our review.
- Provided adequate degrees of freedom, a more structured analysis of heterogeneity using random effects meta-regression on moderator variables and quality rating domain assessments. Moderators will be deemed to significantly account for effect heterogeneity if the meta-regression yields statistically significant coefficients at the 90% level or above. We will also interpret the substantive importance of any such associations by translating the estimated coefficient onto a natural metric for the outcome. The estimate of the conditional between-study variance (tau-squared) will be reported in the table with the estimates of the moderator coefficients.
- Assessment of publication bias via a funnel plot and funnel plot regression (Egger et al., 1997).

The analysis of comparable measures will be carried out using the measures of treatment effect discussed above. The analysis will employ the suite of meta-analysis and random effects meta-regression functions in Stata Version 11. Such analyses will be restricted to sub-groups when necessary to ensure reasonable amounts of comparability.

3.4.1.1 Qualitative Synthesis

As indicated in section 3.1.5.2, aside from the analysis of effectiveness based upon evidence presented in quantitative impact evaluation studies, the qualitative portion of the review will use empirically-based non-impact evaluation studies to: assess factors contributing to the success or failure of interventions; identify how and why intended or unintended outcomes

occur; understand the context in which interventions are carried out; and understand views of beneficiaries.

Once appropriate studies have been identified using the two stage CASP style criteria outlined in 3.1.5.2 and found in Appendices IIIa and IIIb, we propose to use the qualitative metasummary methodology pioneered by Sandelowski and Barroso (cf. Sandelowski et al. 2007; Voils 2008) to analyze their results. This methodology has been termed an "aggregative" approach in that it focuses broadly on quantitatively identifying the frequency of qualitative results found in the research, and is not used to synthesize concepts or create lines of argumentation (Voils et al. 2008).

Metasummaries involve a five stage process to process and evaluate findings: extraction of findings from the research; grouping them into categories; abstracting diverse findings into 'themes' with a comparable and coherent a format; establishing the frequency and intensity of findings; and presenting and interpreting results. While extracting findings, care will be given to ensure that these are separated from: data presented as evidence in the research; conclusions of other work used to support findings; methods used to arrive at findings; and elaborations on the relevance of findings. Creating a matrix of findings grouped by topic and similarity to one another will enable us to better compare results among disparate studies and elucidate possible trends or relationships. Carefully abstracting findings improves comparability by removing unnecessary context and detail while preserving their complexity helps reveal overarching trends and other important insights. Calculating frequency and intensity of findings helps to respectively understand the relative magnitude of findings and which studies contributed most or least to our overall sample of findings. The presentation of findings include a standalone analysis of the findings as well as a discussion of these findings together with those of the quantitative portion of the review (Sandelowski et al. 2007; Voils et al 2008). We will also include a section on gender within the qualitative result.

4 Timeline

Searches for studies: May - June 2012.

Assessment of relevance of studies: June - July 2012.

Extraction of data: July 2012.

Quantitative and qualitative synthesis: August 2012.

Preparation of draft report: September 2012.

Dissemination: October 2012.

Revision of draft report: November 2012.

5 Contribution of authors

Ruth Hall (study design, write-up) is a Senior Researcher on Land Rights and Agrarian Reform at the Institute Poverty, Land and Agrarian Studies and is currently registered for a doctoral degree in Politics at Oxford.

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Steven Lawry (study design, lead author on write-up) is Senior Research Fellow at the Hauser Center for Nonprofit Organizations, Harvard Kennedy School. Over the past 30 years he has carried out research on land tenure and land reform in several African countries, including Senegal, Mali, Nigeria, Togo, Uganda, Kenya, Sudan, Lesotho and South Africa. In 2010 he led a USAID-funded project that helped the Government of South Sudan develop a new national land policy. He headed the Africa program of the University of Wisconsin-Madison's Land Tenure Center from 1990 to 1992.

Aaron Leopold (study design, project coordination) is the Director of Environment and Sustainable Development at the Global Governance Institute, where his current work focuses on bioenergy and large scale land acquisitions in the global South, as well as energy access and energy poverty issues.

Farai Mtero (literature search, literature review, study coding) is a PhD student at the University of the Western Cape, South Africa. His PhD research is on the differential impact of the large scale maize production schemes introduced by the Eastern Cape provincial government in South Africa to revive and commercialize agriculture in the former homelands.

Cyrus Samii (study design, statistical data analysis, write-up) is Assistant Professor with the Wilf Family Department of Politics, New York University. He writes and teaches on quantitative social science methodology and program evaluation as applied to the analysis of conflict management, governance, and development programs. He has designed and implemented studies in Burundi, Cote d'Ivoire, Indonesia, Liberia, and Nepal. He is a co-author of a 3ie-sponsored systematic review on social cohesion interventions in sub-Saharan

Africa (King et al, 2010) and working paper on evaluating stabilization interventions (Samii et al., 2011).

6 Declarations of interest

The individuals involved in this study have no vested interests in the findings of this review, nor do they have incentives to misrepresent or bias findings. As such, there are no conflicts of interest exist that the authors are aware of.

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9 Appendices

9.1 APPENDIX I: POSSIBLE CANDIDATE STUDIES IDENTIFIED VIA A PRELIMINARY SEARCH EXERCISE

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
Daniel Ayalew Ali Klaus Deininger Markus Goldstein	August 2011	Rwanda	Low cost land tenure regularisation	1. Program improved land access for legally married women prompting better recordal of inheritance rights without gender bias. 2. A very large impact on investment and maintenance of soil conservation measures, particularly for female headed households, suggesting that this group had suffered from high levels of tenure insecurity, which the program managed to reduce. 3. Land market activity declined, allowing rejection of the hypothesis that the program caused a wave of distress sales or widespread landlessness by vulnerable people.	Regression discontinuity Geographic discontinuity design with spatial fixed effects	Quantitative effectiveness
Daniel Ayalew Stefan Dercon	May 2005	Ethiopia	State owns all land;	Limited perceived transfer rights, and the threat of expropriation, negatively affects the long-	Fixed effects (household fixed	Quantitative effectiveness

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
Madhur Gautam			Perceived threat of state initiated land redistribution; Restricted transfer rights;	term investment in agriculture, contributing to low returns from land and perpetuating low growth and poverty.	effects over time) Panel data set Longitudinal plot-level and household data to provide micro-level evidence	
Klaus Deininger Juan Sebastian Chamorro	January 2002	Nicaragua	Issuance first of certificates of title followed later by legally recognised registered titles	1. Legal validity of title is important 2. Land values increased by 30% 3. Greatly increased investment in land 4. Failed to reverse decline in land market activity 5. Has not increased beneficiary access to credit 6. Improves distribution of assets and economic opportunities	Fixed effects (fixed effects at the level of farmers but not over time, rather over different plots) Descriptive statistics derived from a nationally representative survey	Quantitative effectiveness
Quy-Toan Do Lakshmi Iyer	May 2007 OR May 2005	Vietnam	1993 Land Law which gave households the	1. Additional land rights led to statistically significant increases in the share of total area devoted to long-term crops and in labor devoted to non-farm activities. 2. However, these changes are not large in	Differences in differences (differences over	Quantitative effectiveness

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
			power to exchange, transfer, lease, inherit and mortgage their land-use rights.	magnitude and appear to be driven mainly by the increased security of tenure provided by the law, rather than by increased access to credit markets or greater land market participation	time across provinces) Survey before and after enactment of the law and factoring in variation in implementation of law	
Sebastian Galiani Ernesto Schargrodsky	January 2010	Buenos Aires, Argentina	Law passed to expropriate former owners' land in order to entitle squatters who occupied the land	1. Substantially increased housing investment, reduced household size, and enhanced the education of the children of title recipients relative to the control group 2. Land titling can be an important tool for poverty reduction, albeit not through credit access, but through increased physical and human capital investment, which should help to reduce poverty in the future generations.	Instrumental variables or an "exogenous shock" – apparently random reactions to govt expropriation law Two surveys, including of a control group "Natural" experiment to	Quantitative effectiveness

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
					overcome endogenous allocation	
Eduardo Nakasone	Aug 2011	Peru	Titling, at "virtually for free" (which addresses problem of endogeneity between household choices and property rights)	1. Hypothesis that land titling has two opposing effects on household labour: reduces labour because it reduces requirements of property guarding; increases labour productivity because reduced risk of expropriation leads to increased investment in the owned land. 2. Found that titling leads to overall increases in household labour allocations to agricultural self-employed activities.	Propensity score matching, also differences-in-differences for some of the estimates Two pieces of information are analyzed: a cross-section survey and a four-round panel dataset of households – uses propensity score matching methods in both data sets	Quantitative effectiveness
Carol Dickerman	1989	Various African countries,	Registration of deeds and title – a review of	1. Many different legal and institutional systems for land rights registration 2. Systematic registration worthwhile when population density and agricultural productivity high enough to	None	Qualitative

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
		including Kenya, Sudan, Senegal, Somalia, Malawi, Ivory Coast	mechanisms for implementation, the impact on tenure security and agricultural productivity	justify costs, or when disputes indicate customary system breakdown and land fragmentation compromises agricultural productivity. 3. Evidence on the link between registration, land markets and improved productivity is ambiguous. 4. Reasons for disappointing results include that customary systems do not necessarily preclude land markets, registration does not necessarily improve credit access nor does it prevent ongoing land fragmentation. It does seem to reduce disputes, at least in the short term. 5. Land registers are not regularly updated as transactions occur and fail to become adjudicatory authorities, with elders continuing to fulfil this role. 6. Titling and registration can exacerbate inequalities where the process is voluntary and the land owner pays the costs because the poor are excluded from benefits. 7. Even systematic titling or registration processes disadvantage “embedded” rights holders who rely on relatives for access, particularly women.		
Niels Kemper Rainer Klump Heiner Schumache	March 2011	Vietnam	Land certification	1. Certified households are more likely to borrow from formal banks with a collateral-based lending policy. 2. Formal loan sizes increase with a positive certification status.	Fixed effects or differences in differences? Instrumental	Quantitative effectiveness

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
				3. Certified households are less likely to borrow from informal sources. 4. Certification effect is clearly more pronounced in parts of South Vietnam, which used to be a separate state with a free market economy, than in North Vietnam, which used to have a centrally planned economy.	variables? We compare credit market outcomes for certified and non-certified households controlling for socio-economic and geographic characteristics, and use an instrumental variable approach exploiting a partial delay in program rollout.	
Erica Field	December 2010	Peru	Titling programme	1. Strengthening property rights in urban slums has a significant effect on residential investment: the rate of housing renovation rises by more than two-thirds of the baseline level. 2. The bulk of the increase is financed without the use of credit, indicating that	Differences in differences – differences over time across reform areas	Quantitative effectiveness

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
				changes over time reflect an increase in investment incentives related to lower threat of eviction	"In a difference-in-difference analysis, I compare the change in housing investment before and after the program among participating households to the change in investment among two samples of nonparticipants."	
Máximo Torero Erica Field	August 2005	Peru	Rural titling programme to over 1.1 million rural households	1. Significant increase in the value of the change and in the current market value of the plot. 2. Improvement in investments in assets less subject to expropriation such as metallic and cement fences 3. Results relating to access to credit are inconclusive. 4. Results of titling on collective action to secure public goods varied.	Propensity score matching "Because the quasi-random program implementation in large measure breaks the link	Quantitative effectiveness

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
					between title acquisition and the variables behind the four channels of impact identified (investment in the household or plot, trade in land, credit demand, and provision of public goods), we are able to construct plausible comparison groups in program and non-program regions via propensity score techniques and use kernel based matching to estimate the	

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
					average treatment effect of government property titling."	
Precious Zikhali	May 2010	Zimbabwe	Accelerated land acquisition and redistribution	1. Evidence suggests that the programme created some tenure insecurity, which adversely affected soil conservation investments among its beneficiaries. 2. There is support for the contention that households make land-related investments to enhance security of tenure.	Nothing in the abstract on method Propensity score matching.	Quantitative effectiveness
Oriena Bandiera	May 2007	Nicaragua	Ownership versus tenancy (?) – the intervention is implicit in this article.	1. Choice of cultivation technique depends on farmers' tenure status even when techniques are observable and contractible. 2. Tree crops are less likely to be grown on rented than on owner-cultivated plots	Fixed effects at level of farmers but not over time, rather over plots with different tenure arrangements Household data	Quantitative effectiveness
Cornilius Chikwama	March 2010	Zimbabwe	?? No clear tenure	1. No evidence to support the hypothesis that income from rural wage employment contributes towards increasing farm investment.	Fixed household effects over time	Quantitative effectiveness

Authors	Date	Country	Intervention type	Outcome	Method of quantitative causal identification	Inclusion? If yes, as:
			intervention described in the paper except that sample is drawn from three resettlement areas	2. Levels of farm investment increase with the amount of labor and land used in farm production in the previous year, and for households with male and/or older household heads. 3. There is an inverse relation between farm investment and farm capital stocks suggesting disinvesting in agriculture over the period studied.	Uses “panel dataset of 359 randomly selected farm households from three resettlement areas in Zimbabwe over the period 1996/97 to 1998/99”	

9.2 APPENDIX II: SCREENING FOR EXPERIMENTAL AND QUASI-EXPERIMENTAL STUDIES

Inclusion Form: Level 1 Screening – Initial Inclusion

1. Is the paper related to primary research done on free-hold land titling or statutory codification and certification of land rights?

   YES free-hold land titling: ☐

   YES statutory codification and certification: ☐

   NO: ☐

2. Context:
   a. Year: _____
   b. Country: _____
   c. Region/locale: _____

3. Does the study examine a developing country?

   YES: ☐ NO: ☐

4. Does the study assess facilitators of, or barriers to:
   a. changes in investments of personal resources into production,
   b. increasing employment through leasing-out or sharecropping,
   c. improving productivity of land use,
   d. increasing income/consumption,
   e. poverty reduction, or
   f. gender-based welfare improvements?

   YES: _____ NO: ☐ UNCLEAR: ☐

5. Is data reported at the household or sub-household level?

   YES: ☐ NO: ☐ UNCLEAR: ☐

6. Was random assignment used to assign groups?

   YES: ☐ NO: ☐ UNCLEAR: ☐

7. What randomized experimental or quasi-experimental methodology was applied?
    a. regression adjustment,
    b. difference-in-differences estimation,
    c. instrumental variables regression,
    d. fixed effects regression,
    e. regression discontinuity, or
    f. matching and inverse-propensity-weighted estimation?
    g. none

    _____ UNCLEAR: ☐

Inclusion Form: Level 2 Screening – Methodological Quality

If yes was answered to questions 1-5 of the level 1 screening questions, please answer the following questions to determine the inclusion of the study.

1. How was randomization or the quasi-experiment carried out specifically?

_____
_____
_____
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_____

2. Were any specific randomization problems noted?

    YES: ☐ NO: ☐

    If yes, what were they?

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3. Where did the comparison group originate?

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_____

4. Were any significant differences between groups treatment and comparison groups noted?

   YES: ☐ NO: ☐

   If yes, what were they?

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5. How were attrition problems dealt with?

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_____

9.3 APPENDIX IIIA: SCREENING FOR NON-EXPERIMENTAL STUDIES

Inclusion Form: Level 1 – Initial Screening

1. Is the paper related to primary research done on free-hold land titling or statutory codification and certification of land rights?

   YES free-hold land titling: ☐

   YES statutory codification and certification ☐

   NO: ☐

2. Context:
   a. Year: _____
   b. Country: _____
   c. Region/locale: _____

3. Is data reported at the household or sub-household level?

   YES: ☐ NO: ☐ UNCLEAR: ☐

4. Does the study assess facilitators of, or barriers to:
   a. changes in investments of personal resources into production,
   b. increasing employment through leasing-out or sharecropping,
   c. improving productivity of land use,
   d. increasing income/consumption,
   e. poverty reduction, or
   f. gender-based welfare outcome measures?

   YES: _____ NO: ☐ UNCLEAR: ☐

5. Does the study provide information on all of the following:
   a. research questions;
   b. data collection procedures;
   c. sampling and recruitment;
   d. and a minimum of two sample characteristics?

   YES: ☐ NO: ☐

9.4 APPENDIX IIIB: SCREENING FOR NON-EXPERIMENTAL STUDIES

Inclusion Form: Level 2 – Quality Screening

1. Is the aim of the study clear?

   YES: ☐ NO: ☐

2. Does the study clearly utilize a relevant theoretical framework?

   YES: ☐ NO: ☐

3. Does the study clearly describe all of the following:
   a. the context?
   b. the sample?
   c. data collection methods?
   d. analysis methods?

   YES: ☐ NO: ☐ SOME: ☐

4. If based upon quantitative survey data, are multivariate tools used to control for confounding variables?

   YES: ☐ NO: ☐

5. Does the data clearly support the papers conclusions?

   YES: ☐ NO: ☐

6. Are conclusions based on the findings from the research?

   YES: ☐ NO: ☐

7. Are any ethical considerations of the research elaborated?

   YES: ☐ NO: ☐