



Hearing their voices: Action research to support women's agency and empowerment in livestock vaccine distribution, delivery and use in Rwanda, Uganda and Kenya

Women Empowerment in Livestock Index (WELI) Baseline Report

KENYA

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WELI

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1. Research Questions

This is the report of the Quantitative Data Analysis done to compliment the Qualitative Analysis Results.

1.1 Primary Research Questions

The primary research questions to be addressed include:

1. Do WELI scores or percentage of indicators achieved differ significantly from baseline to post intervention?
2. Is there an association between gender of respondent and level of empowerment within the livestock sector once they are both adjusted for?
3. Which dimension contributes more to empowerment? E.g. Does control and use of income influence the score the most?
4. Is there an association between perceived extent of participation in vaccination among female livestock keepers and level of empowerment within the livestock sector?

1.2 Secondary Research Questions

Secondary research questions include:

2. Study Methodology

2.1 The research is based on a pre-post design.

The sampling frame was all households in two wards of Kalama, and Kola from Machakos Town Sub-county in Machakos County. Overall, 300 households were sampled, and a total of 400 respondents enrolled into the study: 300 females and 100 males.

2.1.1 Intervention

2.1.2 Sample Size

How the 300 HH (300 women -100men) were arrived at

2.1.3 Data collection

The Woman's Empowerment in Livestock Index (WELI), a standardized survey tool to measure empowerment of women in the livestock sector at the level of the household and along the VVC was used. WELI is an existing Quantitative Survey tool which was customized for Shevax + project to include questions on Vaccines. The survey was administered, using the ODK collect, (an Open Data Kit), which is an android app that is used in survey-based data collection. This app was uploaded onto tablets and phones.

A three-day training on the WELI was conducted prior to field work to provide enumerators with skills and practice to conduct the survey using ODK

The country team and students attended the training at ILRI offered by experts from ILRI
The WELI was then administered to local farmers at their farms or homes.

The field application of the WELI was conducted between October 21 and November 30 in both wards of Kola with 49 villages and Kalama with 98 villages that make up the Kenya study site. The wards are further divided into location and sub locations

All the 49 villages in Kola and 98 villages in Kalama were subjected to a computer generated randomization (each ward separately as they were surveyed at different times) to generate a random list of 1-49 in Kola and 1-98 in Kalama. Since Kalama is twice the size of Kola, it was purposely decided that the number of villages and ultimately number of households surveyed would reflect this and therefore the numbers in Kola would be half the numbers in Kalama. Out of the random lists, a number of villages were serially picked to cover at least 57% of the ward. Therefore in Kola 27 villages were surveyed while in Kalama 56 villages

were surveyed. From the selected villages house -holds (HH) to be surveyed were randomly selected again using the random walk system. Care was also taken to make sure that each location or sub location was represented by at least one village. The number of HH from the selected villages was again proportional to the size of the village and overall wards. Therefore in Kola, 100 HH carrying out interviews with women (25 interviews with men from the same household) were surveyed compared to 200 (75 with men) in Kalama, giving a total of 300 HH and 400 surveys.

A HH coding and tracking system was designed and used by the enumerators. Each enumerator was given a target in terms of HH to be covered per day making sure that the designated number of men were captured during the surveys.

3. Findings

3.1 Demographics

The socio-demographic profile of the survey respondents is described to provide context on the study population. Of the 400 respondents interviewed, we ended up with 381 respondents as having complete interviews/data (95.3%). Of these 75.1% were female and 24.9% male. In total, we interviewed 248 women (86.7%) from dual male-female adult households and 38 (13.3%) from female-only adult households, and 95 men. The analysis focuses on the 381 respondents with complete data in the stata file. Reasons for non-response/missing interviews were (i) incomplete data (ii) missing or mis-matched husband/wife HH (iii) failure to consent.

The female and male participant age ranged from 22 to 85 years with a median of 48 years and 25-90 years with a median of 59 years, respectively. There was significant difference in the average age between the female and male participants (Two-sample Wilcoxon rank-sum test $z=4.422$, $p\text{-value}<0.001$). (Table 1).

Table 1: Participants' sociodemographic profile

	Male (Dual adult male female HHs)	Female (Dual adult male female HHs)	Female (Adult female only)	All Female
Mean age (SD)	57 (15)	48 (13)	56 (14)	49 (13)
Median age (Years)	59	47	57	48
Interquartile range	44 – 68	39 – 58	44 – 65	40 – 59
Min-Max age	25 – 90	22 – 79	22 – 85	22 – 85
No. of observations	95	247*	38	285

*1 index woman's age data was missing.

3.2 Women Empowerment

We describe the empowerment level of women in this study using three domains, namely **intrinsic agency**, **instrumental agency**, and **collective agency**. Each respondent is classified as either adequate (=1) or inadequate (=0) in a given indicator by comparing their responses to the survey questions with a given threshold (Table 14).

1. **Intrinsic agency** – this refers to the ‘power within’, that is the process by which one develops a critical consciousness of their own aspirations, capabilities, and rights. In this study the respondent’s intrinsic agency is assessed using four indicators: autonomy in the use of income from agricultural and non-agricultural activities, self-efficacy, their attitudes about domestic violence, and respect among household members.

The study found (Table 2) that overall, at least half of the respondents had attained adequacy in the four indicators. We find that the performance of women and men varies by indicator; while the percentage of men achieving adequacy in terms

of autonomy in income use (p-value=0.019), and respect among household members (p-value = 0.041), was significantly higher compared to women at 5% level of significance, there was no difference in self-efficacy and attitudes about domestic violence indicators.

Table 2: Share of respondents attaining adequacy in terms of intrinsic agency

	Male Respondents dual adult HH (%)	Female respondents Dual adult HH and female only HH (%)	P-value	Female respondents	
				Adult female only HHs (%)	Dual adult HHs (%)
Autonomy in income use	81.1	68.5	0.019	79.0	66.9
Self-efficacy	67.4	64.0	0.550	60.5	64.5
Attitudes about domestic violence	81.1	85.7	0.282	86.8	85.5
Respect among household members	62.1	50.0	0.041	65.8	47.6
No of observations	95	286		38	248

2. **Instrumental agency** – also known as ‘power to’, refers to the ability of one to take strategic action to achieve their self-defined goals. We use the respondent’s input in overall productive decisions, input in productive decisions relating to livestock, ownership of land and other assets, access to and input on decisions concerning credit, control over use of income in the household, work-life balance, and ability to visit important locations outside home.

We note (Table 3) that the percentage of women reported to have achieved adequacy in terms of input in productive decisions within the households, including livestock farming activities was significantly greater compared men (p-value<0.001). When it comes to work-life balance (p<0.001) and ability to visit important locations outside of the homestead (p=0.035), we find a greater proportion of men doing better compared to the women.

Table 3: Share of respondents attaining adequacy in terms of instrumental agency

	Male Respondents (%)	Female respondents (%)	P-value	Female respondents	
				Adult female only HHs (%)	Dual adult HHs (%)
Input in productive decisions	66.3	86.7	<0.001	86.8	86.7
Input in productive decisions – livestock	61.1	92.3	<0.001	94.7	91.9
Ownership of land other assets	95.8	89.5	0.063	92.1	89.1
Access to and decisions on credit	93.7	94.1	0.895	92.1	94.4

Control over use of income	78.0	82.5	0.316	79.0	83.1
Work balance	59.0	26.2	<0.001	31.6	25.4
Visiting important locations	62.1	49.7	0.035	39.5	51.2
No of observations	95	286		38	248

3. Collective agency – describes the ability to be part of and/or mobilize people around common or shared concerns. This is captured by the group membership indicators.

We find (**Table 4**) that a significantly greater percentage of women compared to men are members of both general community groups (p-value<0.001) and influential groups (p-value<0.001).

Table 4: Share of respondents attaining adequacy in terms of collective agency

	Male Respondents (%)	Female respondents (%)	Chi-sq. (p-value)	Adult female only HHs (%)	Female in Dual adult HHs (%)
Group membership	73.7	92.0	<0.001	89.5	92.3
Influential Group membership	52.6	72.7	<0.001	68.4	73.4
No of observations	95	286		38	248

Overall, the results (Figure 1) show at least 80% of women achieve adequacy in five out the 13 indicators namely; (i) membership in community groups, (ii) access to credit products and services, (iii) decisions regarding asset ownership, (iv) attitudes against domestic violence, and (v) control over income use.

When it comes to the men, at least 80% were adequate in (i) decisions regarding asset ownership (ii) access to credit products and services (iii) attitudes against domestic violence, and (iv) decisions regarding income use.

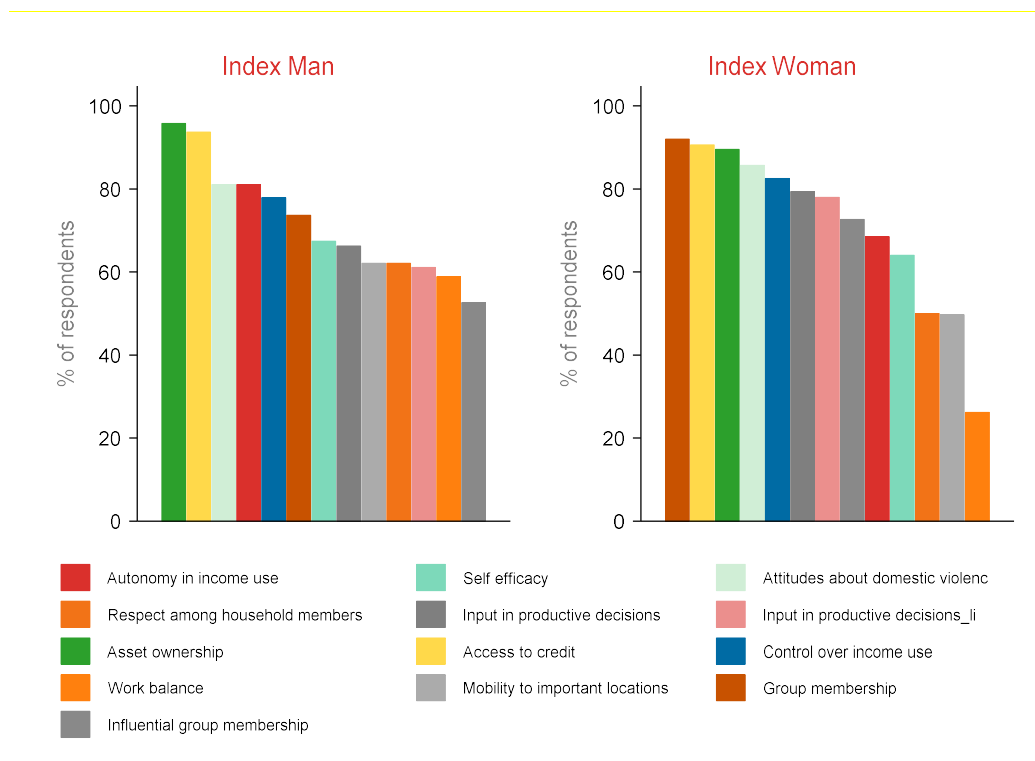


Figure 1: Share of respondents achieving adequacy per indicator by gender.

WELI RESULTS/SCORE

The respondent's overall empowerment score was computed as the weighted average of her/his adequacy scores in the 13 indicators (all weighted 1/13). If their score is at least 75%, or if he/she is adequate in nine out of the 13 indicators, then that respondent was classified as empowered.

Conversely, if the score was below 75%, or if inadequate in 4 or more indicators, then that respondent is classified as disempowered. These individual level scores were then aggregated to construct WELI score which is the weighted mean of two sub-indices: the Three Domains of Empowerment Index (3DE), with a weight of 90 percent, and the Gender Parity Index (GPI), with a weight of 10 percent.

Note that, when constructing GPI only households where two adults, the man and woman were interviewed, were considered. In total, we had 95 dual adult headed households. However, during the data cleaning process, we were able to correctly identify 78 households with complete data from the two household members. The household ID recording error was the main reason for excluding the 17 households at this stage.

We learn (Table 5) that the aggregate WELI score for women in this study is 0.81; this is a weighted average of the 0.79 3DE score of women and 0.92 GPI score. We take notice of the fact that there was no observable difference between the percentage of empowered women (50.0%) and men (52.0%).

Of those women and men who are not yet empowered, the mean adequacy score is 0.58 in both genders, therefore these women and men achieve adequacy in an average of 58% of the 13 indicators.

The study found that approximately 60% of the households achieved gender parity. The average empowerment gap between women who do not achieve gender parity and the men in their households is 18%.

Table 5: WELI Results

Indicator	Men	Women
Number of observations	95	286
3DE score	0.80	0.79
Disempowerment score (1 – 3DE)	0.20	0.21
% achieving empowerment	51.5%	50.3%
% not achieving empowerment	48.5%	49.7%
Mean 3DE score for not yet empowered	0.58	0.58
Mean disempowerment score (1 – 3DE)	0.42	0.42
Gender Parity Index (GPI)		0.92
Number of dual-adult households		78
% achieving gender parity		57.7%
% not achieving gender parity		42.3%
Average empowerment gap		0.18
WELI score		0.81

3.3 Contribution of empowerment indicators to WELI score

To identify the main factors contributing to disempowerment of respondents in this study, the disempowerment index was decomposed by indicator. We find (Figure 2) that work balance (3.2%), visiting important locations (2.0%), respect among household members (2.4%), self-efficacy (2.3%) and autonomy in decision making (1.9%), membership in influential groups (1.7%) indicators contribute most to women’s disempowerment.

The indicators that contribute to men’s disempowerment include membership in influential groups (2.8%), input in productive decisions (1.9%), work balance (2.0%), self-efficacy (2.1%), respect among household members (1.8%), control over use of income (1.6%), and visiting important decisions (1.5%).

Note that the figures in the brackets represent the percentage of disempowered respondents who did not achieve adequacy in the indicator referenced.

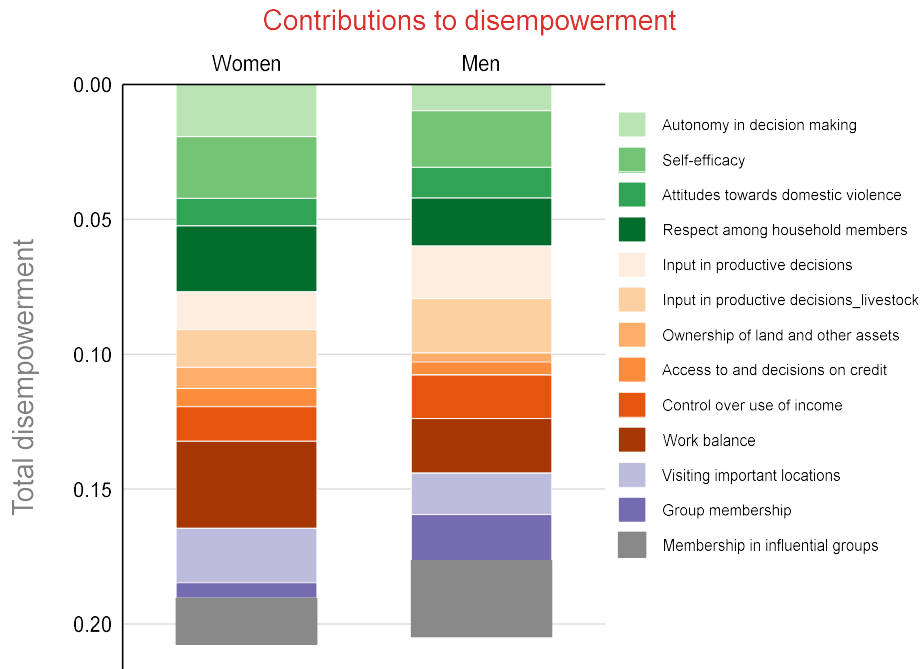


Figure 2: Contribution of each indicator to disempowerment by gender

3.4 WELI score and demographic characteristics

Next, we explore the relationship between the individual WELI scores as a continuous variable and livestock farming activities. The WELI score was computed as the percentage of WELI respondents achieving adequacy in each indicator, that is 1-Weighted Inadequacy count. Looking at the distribution of WELI scores by gender (**Figure 3**), we notice no significant difference in the median WELI score between men and women, and that at least three-quarters of the respondents in each gender were adequate in more than 60% of the indicators.



Figure 3: WELI scores by gender of the respondent

We run a generalized linear regression model using the continuous WELI score as the dependent variable to test the hypothesis that men have higher empowerment scores than women and that older women or men have higher empowerment scores than younger women or men. The results (Table 6) show that there exists a statistically significant relationship between the respondent’s age and WELI scores, after adjusting for gender. This coefficient was significant at 5% level. We find that for each year increase in the respondent’s age, the WELI score increases by a factor of 0.3%.

Table 6: Relationship between WELI score and demographic characteristics

Covariate	Exp (b)	Std. Error	[95% CI]	P-value
Respondent’s gender (Ref group = Index man)	1.020	0.028	0.967 – 1.076	0.459
Respondent’s age in years	1.003	0.001	1.002 – 1.005	<0.001

Number of observations (n=380)

3.5 Participation in livestock activities and related decision making.

The aim of this section is to determine whether empowered women feel that they can participate to a great extent in vaccinating their animals or if their perceived extent of involvement is inversely related or not at all. We begin by exploring the participation of women and men in important livestock activities.

We find a significantly higher proportion of women than men participating in 7 out the 10 important livestock activities (**Table 7**).

Table 7: Share of respondents (%) participating in important livestock activities

Activity	Men	Women	P-value
Animal feeding (a)	58.9%	92.0%	<0.001
Total number of non-missing observations	90	261	
Checking animal health (d)	68.4%	88.8%	<0.001
Total number of non-missing observations	79	251	
Disease preventive measures (e)	57.7%	60.3%	0.744
Total number of non-missing observations	90	261	
Milking animals (g)	66.7%	85.0%	–
Total number of non-missing observations	6	20	
Cleaning animals (i)	38.1%	90.2%	<0.001
Total number of non-missing observations	84	264	
Slaughter animals (j)	45.4%	64.3%	<0.001
Total number of non-missing observations	86	252	
Breeding (l)	39.0%	65.2%	<0.001
Total number of non-missing observations	77	230	
Marketing of live animals and products from live animals (p)	40.3%	59.4%	<0.001
Total number of non-missing observations	77	246	
Selecting which species and breeds to rear (q)	28.6 %	33.3%	0.689
Total number of non-missing observations	21	57	
Sharing livestock workload among household members (r)	75.4%	96.0%	<0.001
Total number of non-missing observations	69	199	

We look at the relationship between the number of agricultural activities, and livestock activities, a respondent is involved in versus empowerment level. This is done by running a multiple generalized linear regression model with WELI score as the dependent variable, against the two covariates, and adjusting for gender, age, and household size.

We observe (**Table 8**) a positive and statistically significant relationship between the number of activities a farmer is involved in and the WELI score, at 5% significance level. Holding other factors constant, for each unit increase in the number of agricultural activities, and livestock activities, an individual is involved in, the expected WELI score increases by factor of 7.0% and 2.0%, respectively.

We also notice an inverse and statistically significant relationship between the household size and WELI score. For each additional member in the household, an individual's expected WELI score decreases by a factor of 2.0%, holding other factors constant.

Table 8: Relationship between empowerment level and participation in agricultural, livestock activities

Covariate	Exp (b)	Std. Error	[95% CI]	P-value
Number of agricultural activities in which individual participates in	1.07	0.01	1.04 – 1.10	<0.001 ***
Number of livestock activities in which individual participates in	1.02	0.01	1.01 – 1.03	0.001 ***
Gender of the respondent (Ref group = Male)	0.98	0.03	0.93 – 1.03	0.457
Respondent age	1.00	<0.01	0.99 – 1.00	0.068
Household size	0.98	0.01	0.97 – 0.99	0.001 ***

No of observations = 377

3.6 Participation and access to Vaccines/Preventive Care and information

When we look at the differences in how the respondent's opinion about their ability to access information regarding vaccinating goats and chicken, we find that there is no observable difference by gender (**Table 9**). Notably, less than 10% of women have access to information regarding vaccinating goats for CCP and chicken for NCD. Overall, only 16.0% have access to information about any of the two vaccines.

Table 9: Share of respondents (%) with access to information about vaccination by gender

Access to information about vaccination	Men	Women	Chi-sq. (p-value)
Have access to information regarding vaccinating goats for CCP	7.8%	8.1%	0.008 (0.927)
Total number of observations	77	234	
Have access to information regarding vaccinating chicken for NCD	12.2%	8.5%	1.127 (0.288)
Total number of observations	90	272	
Have access to information regarding any of the two vaccinations	18.9%	16.0%	0.339 (0.560)
Total number of observations	74	231	

The survey also sought to find out how the respondents feel about vaccinating their goats, and chicken against CCPP and NCD, respectively. The results (**Table 10**) show that slightly lower proportion of women are able to administer the vaccines against CCPP, and NCD. This difference was however not statistically significant, at 5% level.

Table 10: Share of respondents (%) able to vaccinate livestock against CCPP and NCD by gender

Ability to carry out vaccination	Men	Women	Chi-sq. (p-value)
Farmer is able to vaccinate goats against CCPP	19.5%	10.3%	4.650 (0.098)
Total number of observations	77	232	
Farmer is able to vaccinate chicken against NCD	37.8%	32.5%	0.928 (0.629)
Total number of non-missing observations	90	271	
Able to vaccinate livestock against any of the two diseases	46.9%	39.3%	1.438 (0.230)
Total number of non-missing observations	81	244	

To understand whether empowered women feel that they can participate to a great extent in vaccinating their animals or if their perceived extent of involvement is inversely related or not at all, we fit simple generalized linear regression models with WELI score as the dependent variable. We find (**Table 11**) that there is no statistically significant relationship between perceived ability to access information regarding vaccination, or ability of a woman to vaccinate livestock against CCPP/NCD and empowerment score.

Further, we checked whether attending trainings about livestock health helps to empower women. Again, we see no statistically significant association between training attendance and empowerment score.

Table 11: Relationship between vaccine information access, administration, and empowerment level

Independent variables	Exp (b)	Std. Error	[95% CI]	P-value
Perceived ability to access information regarding Vaccination (Ref group = None/small extent); No of observations = 231	0.94	0.04	0.87 – 1.02	0.146
Able to vaccinate livestock against CCPP or NCD (Ref group = No); No of observations = 244	0.95	0.03	0.90 – 1.00	0.066
Attended training about goat or chicken health in the past 12 months (Ref group = No); No of observations = 22	0.91	0.24	0.54 – 1.54	0.727

We sought to explore whether a woman's empowerment level was associated with the reported vaccination rate and number of CCPP, and NCD related deaths. A simple log-binomial regression model was fitted with the vaccine rate as a binary response variable and WELI score as the independent. We find (**Table 12**) no significant relationship between the rate of vaccination and a woman's empowerment score at 5% level.

Two simple negative binomial regression models were run using CCPP and NCD related death counts as response variables, with empowerment score as the explanatory variable. The choice of negative binomial regression over Poisson models was informed by the overdispersion in the response variables.

The results show an inverse and statistically significant relationship between the reported CCPP deaths in the past 12 months and a woman’s empowerment score. For each unit increase in a woman’s empowerment score, the CCPP death rate would be expected to decrease by a factor of 8.0%. There was no statistically significant association between NCD death rate and a woman’s empowerment score.

Table 12: Relationship between empowerment level, vaccination rates and livestock death counts

Dependent variables	Model used	Exp (b)	Std. Error	[95% CI]	P-value
Vaccination rate No of obs. =236	<i>Log binomial model (Reporting Risk ratio)</i>	0.94	0.70	0.22 – 4.07	0.938
Reported number of CCPP deaths in the past 12 months No of obs. =232	<i>Negative binomial regression (Reporting Incidence Rate ratio)</i>	0.08	0.06	0.02 – 0.34	0.001 ***
Reported number of NCD deaths in the past 12 months No of obs. =270		1.35	0.52	0.64 – 2.88	0.431

Lastly, we explore the impact of the respondent’s knowledge about vaccines on their overall empowerment score. For the question about the respondent’s knowledge extent about animal health, the response was recoded to a binary score where 0 represents “Not at all/small extent” and 1 represents “Medium extent/High extent”. This recoding criterion is consistent with the approach used when creating the WELI study indices, particularly on input in productive decisions.

A multiple generalized linear model was fitted with WELI score as the response variable and the three indicators (Table 13) as the covariates. We found that a respondent’s knowledge of where to purchase vaccines against CCPP or NCD is significantly associated with the empowerment level. Individuals who know where to purchase vaccines, compared to those who do not, are likely to have 8.0% greater empowerment score, holding other factors constant.

The study found no significant association between empowerment score and being knowledgeable about animal health, or access to information regarding the vaccines CCPP or NCD, at 5% level.

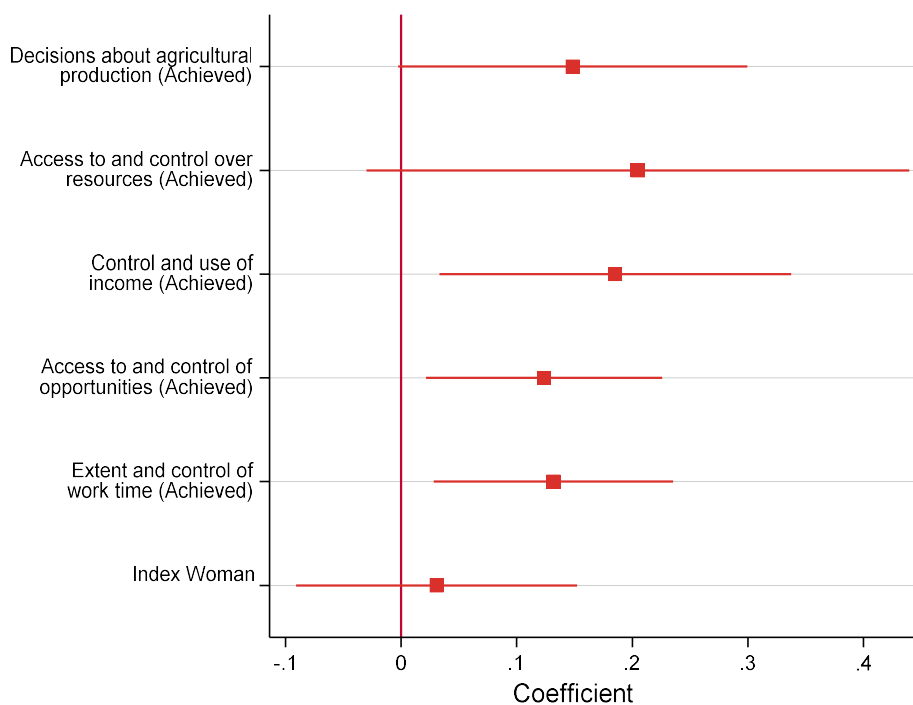
Table 13: Relationship between self-reported vaccination knowledge among female livestock keepers and level of empowerment

Covariates	Exp (b)	Std. Error	[95% CI]	P-value
Knows where to purchase vaccine against CCPP or NCD (Ref group = No);	1.08	0.03	1.02 – 1.15	0.007 **

Knowledgeable about animal health, goat or Chicken (Ref group = Not at all/small extent)	1.01	0.04	0.94 – 1.08	0.791
Have access to information regarding any of the two vaccinations (Ref group = No)	0.93	0.04	0.85 – 1.01	0.099

No of observations = 301

3.7 Relationship between dimension and empowerment level



Covariate	Risk ratio	Std. Error	[95% CI]	P-value	Simple regression pseudo R2
Decisions about agricultural production (Ref = Not achieved)	1.16	0.09	1.00-1.35	0.054	
Access to and control over resources (Ref = Not achieved)	1.23	0.15	0.97-1.55	0.087	
Control and use of income (Ref = Not achieved)	1.20	0.09	1.03-1.40	0.017	
Access to and control of opportunities (Ref = Not achieved)	1.13	0.06	1.02-1.25	0.017	
Extent and control of work time (Ref = Not achieved)	1.14	0.06	1.02-1.27	0.013	

Respondents' gender (Ref = Index man)	1.03	0.06	0.91-1.16	0.619	

4. APPENDIX

Table 14: Description of the WELI Indicator construction

Indicator A	Definition of adequacy
Intrinsic Agency	
Autonomy in income	More motivated by own values than by coercion or fear of others' disapproval: <i>Relative Autonomy Index B score</i> ≥ 1 RAI score is calculated by summing responses to the three vignettes about a person's motivation for how they use income generated from agricultural and non-agricultural activities (yes = 1; no = 0), using the following weighting scheme: 0 for vignette 1 (no alternative), -2 for vignette 2 (external motivation), -1 for vignette 3 (introjected motivation), and +3 for vignette 4 (autonomous motivation)
Self-efficacy	"Agree" or greater on average with self-efficacy questions: <i>New General Self-Efficacy Scale C score</i> ≥ 32
Attitudes about intimate partner violence against women	Believes husband is NOT justified in hitting or beating his wife in all 5 scenarios: D 1) She goes out without telling him 2) She neglects the children 3) She argues with him 4) She refuses to have sex with him 5) She burns the food
Respect among household members	Meets ALL of the following conditions related to their spouse, the other respondent, or another household member: 1) Respondent respects relation (MOST of the time) AND 2) Relation respects respondent (MOST of the time) AND 3) Respondent trusts relation (MOST of the time) AND 4) Respondent is comfortable disagreeing with relation (MOST of the time)
Instrumental Agency	
Input in productive decisions	Meets at least ONE of the following conditions for ALL of the agricultural activities they participate in 1) Makes related decision solely,

	2) Makes the decision jointly and has at least some input into the decisions
	3) Feels could make decision if wanted to (to at least a MEDIUM extent)
Ownership of land and other assets	Owns, either solely or jointly, at least ONE of the following:
	1) At least THREE small assets (poultry, nonmechanized equipment, or small consumer durables)
	2) At least TWO large assets
	3) Land
Access to and decisions on financial services	Meets at least ONE of the following conditions:
	1) Belongs to a household that used a source of credit in the past year AND participated in at least ONE sole or joint decision about it
	2) Belongs to a household that did not use credit in the past year but could have if wanted to from at least ONE source
	3) Has access, solely or jointly, to a financial account
Control over use of income	Has input in decisions related to how to use BOTH income and output from ALL of the agricultural activities they participate in AND has input in decisions related to income from ALL non-agricultural activities they participate in, unless no decision was made
Work balance	Works less than 10.5 h per day:
	Workload = time spent in primary activity + (1/2) time spent in childcare as a secondary activity
Visiting important locations	Meets at least ONE of the following conditions:
	1) Visits at least TWO locations at least ONCE PER WEEK of [city, market, family/relative], or
	2) Visits least ONE location at least ONCE PER MONTH of [health facility, public meeting
Collective Agency	
Group membership	Active member of at least ONE group
Membership in influential groups	Active member of at least ONE group that can influence the community to at least a MEDIUM extent