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GENDER NORMS DATA ENGINE

Validation of G-NORM Scale in Kenya and Nigeria

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Correspondence:
Neetu John, PhD (Pronouns: she/her)
Principal, Gender Research & Programs
Fraym
Email: njohn@fraym.io

Table of Contents

Acknowledgements....3
List of Acronyms....4
Introduction....5
Gender Norms Data Engine Overview....5
Scale Validation Overview....5
Results....8
Summary Statistics....8
Final Confirmatory Factor Model Result....10
Appendix....16
Sex-disaggregated Summary Statistics....16
Confirmatory Factor Analysis: Other Subpopulations....20
Exploratory Factor Analysis....27

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List of Acronyms

Acronym	Definition
AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DHS	Demographic and Health Surveys
EFA	Exploratory Factor Analysis
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SRMR	Standardized Root Mean Square Residual
TLI	Tucker-Lewis Index
WRA	Women of Reproductive Age

Introduction

Gender Norms Data Engine Overview

The Gender Norms Data Engine (GNDE) is a groundbreaking high-frequency data platform that provides large-scale, population-based data on gender norms, behaviors, and outcomes at any geographic level. Its primary goal is to improve the outcomes of adolescent girls and young women by generating high-quality, actionable data. A key component of GNDE's work is to provide a scalable, gold-standard metric for tracking progress toward gender-equitable norms across countries. To achieve this, GNDE selected the G-NORM Scale[1] as its core metric for its strong psychometric properties, rigorous research-based development, and adherence to best practices in social norms research. GNDE strengthened the original measure by validating it with nationally representative data from multiple countries and expanding its scope to include men. Additionally, Fraym's spatial interpolation techniques enhance the scale's precision, enabling hyper-local analysis—down to wards and sub-counties—while providing a reliable measure of community-level norms.

With this validated scale, the gender research community now has a standardized, robust tool to measure gender norms across diverse geographies. The GNDE and scaled up G-NORM Scale fill critical data gaps in gender-focused research, providing stakeholders with reliable, high-quality data to track shifts in gender norms over time, compare trends within and across countries, and inform evidence-based interventions and policies. By equipping policymakers, researchers, and program implementers with this essential data, the GNDE enables more targeted efforts to promote gender equality and track progress toward global commitments, such as Sustainable Development Goal (SDG) 5.

This validation report details the rigorous methodology used to confirm the reliability and validity of the G-NORM Scale in Kenya and Nigeria.

Scale Validation Overview

Fraym conducted a rigorous validation of the Uganda version of the G-NORM scale in Kenya and Nigeria using nationally representative, population-based samples of women and men aged 15–69 years (Nigeria: n=10,211; Kenya: n=5,673).[2] The G-NORM scale, originally developed to measure gender norms in India, was designed to differentiate between descriptive and injunctive norms and to capture social sanctions. The scale was subsequently adapted for use in Nepal and then Uganda. The Uganda version of the G-NORM comprises 20 items—10 descriptive norms and 10 injunctive norms.

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[1] Sedlander, E., Bingenheimer, J. B., Long, M. W., Swain, M., & Rimal, R. N. (2022). The G-NORM scale: Development and validation of a theory-based gender norms scale. *Sex roles*, *87*(5), 350-363; Sedlander, E., Granovsky, R., Birabwa, C., Amongin, D., Wasswa, R., Diamond-Smith, N., Waiswa, P., Holt, K., & Bingenheimer, J. B. (2024, November 4). *Adaptation of the G-NORM (Gender norms scale) in Uganda: An examination of how gender norms are associated with reproductive health decision-making.* PLOS ONE. https://doi.org/10.1371/journal.pone.0308249

[2] Fraym. (2024). *Kenya Wave 4B Round 1 [Q1 2024].* Gender Norms Data Engine; Fraym. (2024). *Nigeria Wave 4B Round 1 [Q1 2024].* Gender Norms Data Engine.

We used Confirmatory Factor Analysis (CFA) to test whether the original properties of the scale from Uganda held in Kenya and Nigeria. Given that the Uganda version of the scale was developed for the Sub-Saharan African context, we hypothesized that the original structure would hold in both Kenya and Nigeria, justifying the use of CFA over Exploratory Factor Analysis (EFA). To enhance the rigor and robustness of the validation process, we conducted several sensitivity analyses. We split the sample into two equal halves using the 'splitsample' function in STATA 17, balancing by administrative division, gender, and age. CFA was implemented in both halves and cross-checked before being applied to the full sample. We also evaluated the scale's performance among women of reproductive age, given that the original Uganda G-NORM was validated in this subgroup. Additional sensitivity tests were conducted using EFA.

The CFA confirmed that the original scale properties transferred well to Kenya and Nigeria, revealing a good model fit with only one item needing removal to achieve robustness in both countries. The CFA was conducted across multiple samples, including split samples and the subgroup of women of reproductive age, aligning with best practices in scale validation. This approach ensures the model's stability and generalizability across different population subsets, thereby strengthening the scale's validity.[3] The EFA did not yield a theoretically coherent or practical solution, further confirming that the CFA provided a superior solution. Finally, Cronbach's alphas were used to assess the internal consistency of the final resulting scales and sub-scales, further ensuring the reliability of the validated scale.

Confirmatory Factor Analysis

The CFA models were executed using the SEM command in STATA 17, employing maximum likelihood estimation methods with Satorra-Bentler adjustments to account for the ordinal data structure. Model quality was assessed by examining factor loadings and various fit indices, including chi-squared, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC). Items not loading at least 0.40 on their assigned factor were considered for removal unless there was a strong content validity justification to retain them. Adequate model fit was determined based on predefined threshold criteria for these indices, ensuring the robustness and validity of the factor structure. Specifically, good model fit was indicated by TLI and CFI values equal to or greater than 0.90, RMSEA less than 0.08, and SRMR less than 0.10. Additionally, lower AIC and BIC values were interpreted as indicating better model fit.[4]

Exploratory Factor Analysis

The results of the initial EFA are summarized in the Appendix, Tables A5 and A6. The EFA process involved several steps: We assessed the number of factors to extract using Principal Component Analysis (PCA), Horn's Parallel Analysis, scree plots, and the proportion of variance explained. EFA with promax rotations was conducted to understand the underlying factor structure, with multiple

[3] Byrne, B. M. (2013). Structural equation modeling with AMOS: Basic concepts, applications, and programming (2nd ed.). Routledge.
[4] Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*(1), 4–70.

iterations to refine the models. Items with loadings less than 0.40, items loading on more than one factor, or items showing high uniqueness (>0.80) were dropped until a satisfactory scale was reached.

The exploratory factor analyses (EFAs) in Nigeria and Kenya yielded two-factor solutions. In Nigeria, all 20 original items were retained, while in Kenya, two pairs of descriptive and injunctive norm items were removed, resulting in a 16-item scale. However, the items did not distinctly separate into injunctive and descriptive norms, which is recommended by Social Norms Theory[5], as in the original Uganda scale. Achieving this separation would require confirmatory factor analysis (CFA), which would ultimately result in a four-factor model that is less parsimonious and more complex to use. Additionally, the item loadings on factors did not demonstrate theoretical coherence. The lack of theoretical consistency with the two-factor solution, combined with the complex structure that could diminish practical relevance, further confirmed that the solution achieved via CFA was more robust and practically useful.[6]

[5] Rimal, R. N., & Lapinski, M. K. (2015). A re-explication of social norms, ten years later. *Communication Theory, 25*(4), 393–409. https://doi.org/10.1111/comt.12080
[6] DeVellis, R. F. (2017). Scale development: Theory and applications (4th ed.). Sage Publications.

Results

The following paragraphs present summary statistics for the scale and the results from the final CFA models. Additional models used to assess robustness and validate the findings are provided in the appendix.

Summary Statistics

Nigeria

Table 1 presents the mean norm scores and standard deviations across the G-NORM items for the full sample population (females and males aged 15–69). Sex-disaggregated scale scores are available in Appendix Table A1.1-A1.2. In Nigeria, there is relatively strong community support for women working outside the home after marriage and against being sent back to their parents in cases of disobedience. In contrast, Nigerian norms are relatively less supportive—both descriptively and injunctively—of wives making decisions about buying or owning major household items or family planning.

Table 1: Nigeria G-NORM Items: Mean Scores and Standard Deviations (SD)

Items	Norms Score[1] Mean (SD) (n = 10,211)
Descriptive	
If a woman earns money, it will cause problems in her marriage.	3.57 (1.18)
Only men make decisions about household income and expenses.	2.98 (1.25)
Husbands make the final decision about how many children to have.	2.75 (1.21)
Men make the final decision about their wife (or partner) using family planning methods.	2.77 (1.20)
If a woman disobeys her husband, she is sent back to her parents (or sent away).	3.51 (1.23)
Only women do the cooking, cleaning, and caring of children.	2.66 (1.29)
Women stop working when they get married.	3.57 (1.18)
Girls stop going to school if they get pregnant.	2.48 (1.22)
Husbands make the final decisions about buying major household items (e.g., television, bicycle, phone).	2.31 (1.11)
If there is only enough money for one cell phone for the household, the husband owns it.	2.23 (1.06)
Injunctive	
A woman should not work outside the home to keep peace in her marriage.	3.32 (1.27)
Only men should make decisions about income and expenses.	2.95 (1.24)
Husbands should make the final decision about how many children to have.	2.72 (1.20)

Men should make the final decision about their wife using family planning.	2.72 (1.19)
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	3.60 (1.20)
Only women should do the cooking, cleaning, and caring of children.	2.79 (1.32)
Women should stop working when they get married.	3.61 (1.17)
Girls should stop going to school if they get pregnant	2.58 (1.25)
Husbands should make final decisions about buying major household items (e.g., television, bicycle, phone).	2.34 (1.12)
If there is only enough money for one cell phone for the household, the husband should own it.	2.26 (1.07)

[1]All items are reverse coded such that a higher score indicates a lower level of agreement with the negatively worded statement. Scores range from 1-5, where a higher number indicates less support for the negatively worded norm.

Kenya

Kenya shows relatively high levels of community support for both descriptive and injunctive norms regarding women continuing to work even after marriage, as well as opposition to norms favoring full male control over childbearing and family planning (Table 2). In contrast, Kenyan norms are relatively less supportive—both descriptively and injunctively—of wives making decisions about buying or owning major household items or of male involvement in domestic tasks. Sex-disaggregated scale scores are available in Appendix Table A2.1-A2.2.

Table 2: Kenya G-NORM Items: Mean Scores and Standard Deviations (SD)

Items	Norms Score[2] Mean (SD) (n=5,673)
Descriptive	
If a woman earns money, it will cause problems in her marriage.	3.32 (1.55)
Only men make decisions about household income and expenses.	3.11 (1.51)
Husbands make the final decision about how many children to have.	3.16 (1.52)
Men make the final decision about their wife (or partner) using family planning methods.	3.29 (1.50)
If a woman disobeys her husband, she is sent back to her parents (or sent away).	3.05 (1.56)
Only women do the cooking, cleaning, and caring of children.	2.49 (1.52)
Women stop working when they get married.	3.67 (1.44)
Girls stop going to school if they get pregnant.	2.68 (1.54)
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	2.69 (1.53)

If there is only enough money for one cell phone for the household, the husband owns it.	2.70 (1.52)
Injunctive	
A woman should not work outside the home to keep peace in her marriage.	3.57 (1.51)
Only men should make decisions about income and expenses.	3.17 (1.53)
Husbands should make the final decision about how many children to have.	3.20 (1.52)
Men should make the final decision about their wife using family planning.	3.35 (1.51)
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	3.04 (1.57)
Only women should do the cooking, cleaning, and caring of children.	2.50 (1.53)
Women should stop working when they get married.	3.83 (1.39)
Girls should stop going to school if they get pregnant	3.31 (1.55)
Husbands should make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	2.76 (1.55)
If there is only enough money for one cell phone for the household, the husband should own it.	2.77 (1.54)

[2]All items are reverse coded such that a higher score indicates a lower level of agreement with the negatively worded statement . Scores range from 1-5, where a higher number indicates less support for the negatively worded norm.

Final Confirmatory Factor Model Result

Nigeria

Table 3 present model fit statistics and factor loadings for both the original Uganda CFA models and a modified version where an item with a very low loading (below 0.30) was dropped. Both models include pairwise correlated errors between analogous descriptive and injunctive norms. Versions of these models with uncorrelated errors were also tested but did not meet standard threshold values for various fit indices and are not included here. To confirm the suitability of the CFA model for the Nigerian data, we ran the CFA on three additional subpopulations in addition to the full population model results: two random halves of the dataset and the full population of women of reproductive age (WRA), defined as those under 50 years old, consistent with both DHS and WHO definitions. Results for these CFA models across all subpopulations are reported in Appendix Table A3.1-A3.3

In Table 3, the modified scale (Model 2)—excluding the descriptive norm regarding married women not working—consistently outperforms the original G-NORM model (Model 1) from Uganda. Notable improvements include an increase in the Comparative Fit Index (CFI) from 0.895 to 0.906 and the Tucker-Lewis Index (TLI) from 0.874 to 0.886. This adjustment results in a model that meets the threshold for CFI and approaches the threshold for TLI. Additionally, all loadings are above 0.40, with only two items having loadings at 0.39. These results align with standards for a well-fitting model and confirm that the Uganda G-NORM structure is more suitable for the Nigerian context compared to the original G-NORM model from India tested earlier. The resulting scale and

its descriptive and injunctive sub-scales, presented in Table 4, also exhibit good internal consistency, with Cronbach's alpha indicating reliability. The additional CFA models conducted on other subpopulations similarly supported the robustness of the final model.

Table 3: Nigeria Final G-NORM Confirmatory Factor Analysis Results

Model	Original G-NORMS Uganda (Two Factors) (Model 1)	G-NORMS Uganda, Without Descriptive Problem Item (Two Factors) (Model 2)
Fit Statistics	**Statistics**	
Root Mean Square Error of Approximation (RMSEA)	0.058	0.057
Standardized Root Mean Squared Residual (SRMR)	0.067	0.062
Comparative Fit Index (CFI), Santorra Bentler	0.895	0.906
Tucker-Lewis Index (TLI), Santorra Bentler	0.874	0.886
Model vs. Saturated Chi Squared	5,667.000	4,893.023
Baseline vs. Saturated Chi Squared	52,515.986	50,455.740
Aikake Information Criteria (AIC)	591,974.881	561,168.627
Bayesian Information Criteria (BIC)	592,488.298	561,653.119
Items	**Factor Loadings**	
Descriptive		
If a woman earns money, it will cause problems in her marriage.	0.29	--
Only men make decisions about household income and expenses.	0.61	0.61
Husbands make the final decision about how many children to have.	0.64	0.64
Men make the final decision about their wife (or partner) using family planning methods.	0.59	0.59
If a woman disobeys her husband, she is sent back to her parents (or sent away).	0.44	0.44
Only women do the cooking, cleaning, and caring of children.	0.60	0.61
Women stop working when they get married.	0.45	0.44

Girls stop going to school if they get pregnant.	0.42	0.42
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	0.54	0.55
If there is only enough money for one cell phone for the household, the husband owns it.	0.39	0.39
Injunctive		
A woman should not work outside the home to keep peace in her marriage.	0.48	0.47
Only men should make decisions about income and expenses.	0.65	0.65
Husbands should make the final decision about how many children to have.	0.66	0.66
Men should make the final decision about their wife using family planning.	0.61	0.61
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	0.39	0.39
Only women should do the cooking, cleaning, and caring of children.	0.62	0.62
Women should stop working when they get married.	0.45	0.44
Girls should stop going to school if they get pregnant	0.45	0.46
Husbands should make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	0.55	0.55
If there is only enough money for one cell phone for the household, the husband should own it.	0.40	0.40

* Good-fitting models are indicated by a Tucker-Lewis (TLI) and Comparative Fit Index (CFI) equal to or greater than 0.90 and a Root Mean Square Error Approximation (RMSEA) less than 0.08, and standardized root mean squared residual (SRMR) less than 0.10. Aikake Information Criteria (AIC), Bayesian Information Criteria (BIC) – smaller numbers = better fitting model (Vandenberg and Lance, 2000).

Table 4: Nigeria Cronbach's Alpha Scores for Scales and Sub-Scales of Final G-NORMS CFA Models

	Number of Items	Cronbach's Alpha
Original Uganda Model (Model 1)	**20**	**87.89**
Descriptive Norms	10	76.74
Injunctive Norms	10	79.39
Uganda Model, Minus Descriptive Problem Item (Final Model)	**19**	**87.95**
Descriptive Norms	9	76.78
Injunctive Norms	10	79.39

Kenya

Table 5 present model fit statistics and factor loadings from the two CFA models for the G-NORM items in Kenya: the original Uganda version and a modified version that dropped one item with a very low loading. Both models include pairwise correlated errors between analogous descriptive and injunctive norms. Versions of each model with uncorrelated errors were also attempted but did not meet standard model threshold values for various fit indices. Similar to Nigeria, we ran the CFA on three additional subpopulations in addition to the full population model results: two random halves of the dataset and the full population of women of reproductive age. Results for these CFA models across all subpopulations are reported in Appendix Table A4.1-A4.3

As shown in Table 5, the modified model (Model 2)—excluding the descriptive norm concerning the issue of a married woman working—performed better than the original Uganda model (Model 1). The most notable improvements include an increase in the Comparative Fit Index (CFI) from 0.898 to 0.909 and the Tucker-Lewis Index (TLI) from 0.878 to 0.890. These improvements bring the model to meet or closely approach the standard thresholds for model acceptability. Additionally, in Kenya, all model loadings are above 0.40.

Like Nigeria, in Kenya too, the Uganda G-NORM model requires only a minor adjustment to the indicator set by dropping the same item, resulting in a model that is parsimonious, interpretable, and meets or closely approaches most model fit thresholds. This approach strikes a balance between optimizing model fit characteristics and maintaining fidelity to the original Uganda model structure. The resulting scale and its descriptive and injunctive sub-scales, presented in Table 6, also exhibit good internal consistency, with Cronbach's alpha indicating reliability. The additional CFA models conducted on other subpopulations similarly support the robustness of the final model.

Table 5: Kenya Final G-NORM Confirmatory Factor Analysis Results

Model	Original G-NORMS Uganda (Two Factors) (Model 1)	G-NORMS Uganda, Without Descriptive Problem Item (Two Factors) (Model 2)
Fit Statistics	**Statistics**	
Root Mean Square Error of Approximation (RMSEA)	0.062	0.061
Standardized Root Mean Squared Residual (SRMR)	0.063	0.059
Comparative Fit Index (CFI), Santorra Bentler	0.898	0.909
Tucker-Lewis Index (TLI), Santorra Bentler	0.878	0.890
Model vs. Saturated Chi Squared	3,577.233	3,105.799
Baseline vs. Saturated Chi Squared	33,759.395	32,682.614
Aikake Information Criteria (AIC)	379,844.251	359,369.731

Bayesian Information Criteria (BIC)	380,315.938	359,814.843
Items	**Factor Loadings**	
Descriptive		
If a woman earns money, it will cause problems in her marriage.	0.28	--
Only men make decisions about household income and expenses.	0.57	0.57
Husbands make the final decision about how many children to have.	0.54	0.53
Men make the final decision about their wife (or partner) using family planning methods.	0.45	0.44
If a woman disobeys her husband, she is sent back to her parents (or sent away).	0.45	0.45
Only women do the cooking, cleaning, and caring of children.	0.53	0.54
Women stop working when they get married.	0.53	0.52
Girls stop going to school if they get pregnant.	0.49	0.48
Husbands make final decisions about buying major household items (e.g., television, bicycle, phone).	0.62	0.63
If there is only enough money for one phone for the household, the husband owns it.	0.54	0.55
Injunctive		
A woman should not work outside the home to keep peace in her marriage.	0.51	0.50
Only men should make decisions about income and expenses.	0.69	0.69
Husbands should make the final decision about how many children to have.	0.63	0.63
Men should make the final decision about their wife using family planning.	0.56	0.56
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	0.51	0.51
Only women should do the cooking, cleaning, and caring of children.	0.60	0.60
Women should stop working when they get married.	0.58	0.58
Girls should stop going to school if they get pregnant	0.57	0.57
Husbands should make final decisions about buying major household items (e.g., television, bicycle, phone).	0.65	0.65
If there is only enough money for one phone for household, the husband should own it.	0.55	0.56

*Good-fitting models are indicated by a Tucker-Lewis (TLI) and Comparative Fit Index (CFI) equal to or greater than 0.90 and a Root Mean Square Error Approximation (RMSEA) less than 0.08, and standardized root mean squared residual (SRMR) less than 0.10. Aikake Information Criteria (AIC), Bayesian Information Criteria (BIC) – smaller numbers = better fitting model (Vandenberg and Lance, 2000).

Table 6: Kenya Cronbach's Alpha Scores for Scales and Sub-scales of Final CFA Models

	Number of Items	Cronbach's Alpha
Original Uganda Model (Model 1)	**20**	**88.94**
Descriptive Norms	10	76.94
Injunctive Norms	10	83.89
Uganda Model, Minus Descriptive Problem Item (Final Model)	**19**	**89.16**
Descriptive Norms	9	75.87
Injunctive Norms	10	83.89

Appendix

Sex-disaggregated Summary Statistics

Tables A1.1-A2.2 present the sex-disaggregated G-NORM characteristics for Nigeria and Kenya, respectively, highlighting statistically significant gender differences at the 0.05 level

Table A1.1: Sex-Disaggregated Nigeria G-NORM Items: Mean Scores and Standard Deviations (SD) of Descriptive Items

Items	Male Norms Score[3] Mean (SD) (n=3,441)	Female Norms Score[3] Mean (SD) (n=6,770)	Absolute Differential in Norms Score
Descriptive			
If a woman earns money, it will cause problems in her marriage.	3.51* (1.21)	3.60* (1.17)	0.09*
Only men make decisions about household income and expenses.	2.96 (1.24)	3.00 (1.25)	0.03
Husbands make the final decision about how many children to have.	2.74 (1.22)	2.75 (1.21)	0.01
Men make the final decision about their wife (or partner) using family planning methods.	2.73* (1.19)	2.78* (1.2)	0.05*
If a woman disobeys her husband, she is sent back to her parents (or sent away).	3.46 (1.24)	3.54 (1.23)	0.08*
Only women do the cooking, cleaning, and caring of children.	2.78* (1.28)	2.60* (1.29)	0.18*
Women stop working when they get married.	3.57 (1.19)	3.57 (1.18)	0.00
Girls stop going to school if they get pregnant.	2.54* (1.22)	2.45* (1.22)	0.09*
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	2.32 (1.12)	2.31 (1.11)	0.02
If there is only enough money for one cell phone for the household, the husband owns it.	2.19* (1.05)	2.24* (1.07)	0.05*

Table A1.2: Sex-Disaggregated Nigeria G-NORM Items: Mean Scores and Standard Deviations (SD) of Injunctive Items

Items	Male Norms Score[3] Mean (SD) (n=3,441)	Female Norms Score[3] Mean (SD) (n=6,770)	Absolute Differential in Norms Score
Injunctive			
A woman should not work outside the home to keep peace in her marriage.	3.27* (1.27)	3.34* (1.26)	0.06*
Only men should make decisions about income and expenses.	2.99* (1.24)	2.93* (1.24)	0.06*
Husbands should make the final decision about how many children to have.	2.71 (1.21)	2.73 (1.19)	0.02
Men should make the final decision about their wife using family planning.	2.71 (1.19)	2.73 (1.19)	0.02
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	3.55* (1.21)	3.63* (1.2)	0.09*
Only women should do the cooking, cleaning, and caring of children.	2.89* (1.3)	2.74* (1.32)	0.15*
Women should stop working when they get married.	3.61 (1.16)	3.6 (1.18)	0.01
Girls should stop going to school if they get pregnant	2.66* (1.25)	2.54* (1.24)	0.12*
Husbands should make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	2.39* (1.14)	2.32* (1.11)	0.07*
If there is only enough money for one cell phone for the household, the husband should own it.	2.22* (1.06)	2.27* (1.08)	0.05*

[3] All items are reverse coded such that a higher score indicates a lower level of agreement with the negatively worded statement . Scores range from 1-5, where a higher number indicates less support for the negatively worded norm. * indicates a statistically significant difference at the $p < 0.05$ threshold

Table A2.1: Sex-Disaggregated Kenya G-NORM Items: Mean Scores and Standard Deviations (SD) of Descriptive Items

Items	Male Norms Score[3] Mean (SD) (n=1,810)	Female Norms Score[3] Mean (SD) (n=3,863)	Absolute Differential in Norms Score
Descriptive			
If a woman earns money, it will cause problems in her marriage.	3.08* (1.57)	3.43* (1.53)	0.35*
Only men make decisions about household income and expenses.	2.96* (1.51)	3.18* (1.51)	0.23*
Husbands make the final decision about how many children to have.	3.11 (1.49)	3.18 (1.53)	0.07
Men make the final decision about their wife (or partner) using family planning methods.	3.23* (1.48)	3.32* (1.5)	0.09*
If a woman disobeys her husband, she is sent back to her parents (or sent away).	2.85* (1.53)	3.14* (1.57)	0.29*
Only women do the cooking, cleaning, and caring of children.	2.56* (1.51)	2.45* (1.52)	0.11*
Women stop working when they get married.	3.66 (1.41)	3.67 (1.46)	0.01
Girls stop going to school if they get pregnant.	2.59* (1.5)	2.73* (1.55)	0.14*
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	2.59* (1.51)	2.74* (1.54)	0.15*
If there is only enough money for one cell phone for the household, the husband owns it.	2.6* (1.49)	2.74* (1.52)	0.13*

Table A2.2: Sex-Disaggregated Kenya G-NORM Items: Mean Scores and Standard Deviations (SD) of Injunctive Items

Items	Male Norms Score[3] Mean (SD) (n=1,810)	Female Norms Score[3] Mean (SD) (n=3,863)	Absolute Differential in Norms Score
Injunctive			
A woman should not work outside the home to keep peace in her marriage.	3.55 (1.49)	3.59 (1.52)	0.04
Only men should make decisions about income and expenses.	3.09* (1.52)	3.21* (1.53)	0.12*
Husbands should make the final decision about how many children to have.	3.09* (1.51)	3.25* (1.52)	0.16*
Men should make the final decision about their wife using family planning.	3.28* (1.5)	3.38* (1.51)	0.10*
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	2.86* (1.55)	3.13* (1.58)	0.27*
Only women should do the cooking, cleaning, and caring of children.	2.52 (1.51)	2.49 (1.54)	0.03
Women should stop working when they get married.	3.87 (1.35)	3.82 (1.41)	0.05
Girls should stop going to school if they get pregnant.	3.27 (1.53)	3.32 (1.56)	0.05
Husbands should make final decisions about buying major household items (e.g., television, bicycle, phone).	2.7 (1.53)	2.79 (1.57)	0.09
If there is only enough money for one phone for the household, the husband should own it.	2.67* (1.52)	2.82* (1.55)	0.15*

[3] All items are reverse coded such that a higher score indicates a lower level of agreement with the negatively worded statement . Scores range from 1-5, where a higher number indicates less support for the negatively worded norm. * indicates a statistically significant difference at the $p < 0.05$ threshold.

Confirmatory Factor Analysis: Other Subpopulations

Nigeria

Table A3.1-A3.3 presents the results of our sensitivity tests with various sub-populations. We first assessed the model fit for the original Uganda scale and then for the modified version, in which we removed the descriptive norm item due to low loadings, consistent with the final model. The table includes model fit statistics and loadings from the confirmatory factor analysis for both the original Uganda model (Model 1, Orig) and the modified version without the descriptive 'problem' item (No Des Prob). This analysis was conducted across various subpopulations, including split halves of the sample (referred to in the table as CFA1 and CFA2) and Women of Reproductive Age (WRA), defined as females under the age of 50. The table shows that model fit and loading values are approximately similar across these subpopulations.

Table A3.1: Nigeria Confirmatory Factor Analysis: Fit Statistics of Alternate Subpopulations

Fit Statistics	CFA1 Subpop: Model 1 (Orig)	CFA1 Subpop: Model 2 (No Des Prob)	CFA2 Subpop Model 1 (Orig)	CFA2 Subpop: Model 2 (No Des Prob)	WRA Subpop: Model 1 (Orig)	WRA Subpop: Model 2 (No Des Prob)
Root Mean Square Error of Approximation (RMSEA)	0.057	0.055	0.059	0.059	0.060	0.058
Standardized Root Mean Squared Residual (SRMR)	0.067	0.061	0.068	0.064	0.071	0.065
Comparative Fit Index (CFI), Santorra Bentler	0.896	0.908	0.895	0.904	0.891	0.903
Tucker-Lewis Index (TLI), Santorra Bentler	0.871	0.890	0.874	0.885	0.869	0.883
Model vs. Saturated Chi Squared	2,789.244	2,357.556	3,010.669	2,642.371	3,718.580	3,167.666
Baseline vs. Saturated Chi Squared	25,438.078	24,355.264	27,273.339	26,261.676	32,704.509	31,313.071
Aikake Information Criteria (AIC)	295,507.372	280,183.789	296,555.591	281,071.746	364,716.330	345,987.402
Bayesian Information Criteria (BIC)	295,971.513	280,621.781	297,019.856	281,509.856	365,195.561	346,439.634

Table A3.2: Nigeria Confirmatory Factor Analysis: Loadings for Descriptive Items of Alternate Subpopulations

Items	CFA1 Subpop: Model 1 (Orig)	CFA1 Subpop: Model 2 (No Des Prob)	CFA2 Subpop Model 1 (Orig)	CFA2 Subpop: Model 2 (No Des Prob)	WRA Subpop: Model 1 (Orig)	WRA Subpop: Model 2 (No Des Prob)
Descriptive						
If a woman earns money, it will cause problems in her marriage.	0.31	--	0.27	--	0.26	--
Only men make decisions about household income and expenses.	0.60	0.60	0.62	0.61	0.62	0.61
Husbands make the final decision about how many children to have.	0.62	0.62	0.66	0.66	0.64	0.64
Men make the final decision about their wife (or partner) using family planning methods.	0.57	0.58	0.60	0.60	0.59	0.59
If a woman disobeys her husband, she is sent back to her parents (or sent away).	0.42	0.42	0.46	0.45	0.44	0.43
Only women do the cooking, cleaning, and caring of children.	0.60	0.60	0.61	0.61	0.63	0.63
Women stop working when they get married.	0.45	0.44	0.45	0.44	0.42	0.41
Girls stop going to school if they get pregnant.	0.41	0.41	0.43	0.43	0.44	0.44
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	0.53	0.53	0.55	0.56	0.55	0.56
If there is only enough money for one cell phone for the household, the husband owns it.	0.38	0.38	0.39	0.40	0.41	0.41

Table A3.3: Nigeria Confirmatory Factor Analysis: Loadings for Injunctive Items of Alternate Subpopulations

Items	CFA1 Subpop: Model 1 (Orig)	CFA1 Subpop: Model 2 (No Des Prob)	CFA2 Subpop Model 1 (Orig)	CFA2 Subpop: Model 2 (No Des Prob)	WRA Subpop: Model 1 (Orig)	WRA Subpop: Model 2 (No Des Prob)
Injunctive						
A woman should not work outside the home to keep peace in her marriage.	0.48	0.47	0.48	0.47	0.44	0.43
Only men should make decisions about income and expenses.	0.64	0.64	0.66	0.65	0.66	0.65
Husbands should make the final decision about how many children to have.	0.65	0.66	0.67	0.67	0.67	0.67
Men should make the final decision about their wife using family planning.	0.59	0.60	0.62	0.62	0.61	0.61
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	0.41	0.40	0.39	0.38	0.37	0.37
Only women should do the cooking, cleaning, and caring of children.	0.61	0.61	0.62	0.62	0.63	0.63
Women should stop working when they get married.	0.45	0.44	0.45	0.44	0.42	0.41
Girls should stop going to school if they get pregnant	0.45	0.45	0.46	0.46	0.46	0.46
Husbands should make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	0.54	0.54	0.56	0.56	0.56	0.56
If there is only enough money for one cell phone for the household, the husband should own it.	0.39	0.40	0.40	0.41	0.41	0.41

Kenya

Tables A4.1-A4.3 present the model fit statistics and loadings from the confirmatory factor analysis for both the original Uganda model (Model 1, Orig) and the modified version excluding the first descriptive 'problem' item (No Des Prob). This analysis was performed across various subpopulations, including split halves of the sample (referred to in the table as CFA1 and CFA2) and Women of Reproductive Age (WRA), defined as females under the age of 50. The table demonstrates that model fit and loading values are approximately similar across these subpopulations.

Table A4.1: Kenya Confirmatory Factor Analysis: Fit Statistics of Alternate Subpopulations

Fit Statistics	CFA Subpop: Model 1 (Orig)	CFA Subpop: Model 2 (No Des Prob)	EFA Subpop Model 1 (Orig)	EFA Subpop: Model 2 (No Des Prob)	WRA Subpop: Model 1 (Orig)	WRA Subpop: Model 2 (No Des Prob)
Root Mean Square Error of Approximation (RMSEA)	0.063	0.062	0.060	0.060	0.063	0.062
Standardized Root Mean Squared Residual (SRMR)	0.065	0.060	0.062	0.060	0.064	0.060
Comparative Fit Index (CFI), Santorra Bentler	0.895	0.907	0.902	0.910	0.898	0.909
Tucker-Lewis Index (TLI), Santorra Bentler	0.874	0.889	0.889	0.892	0.878	0.890
Model vs. Saturated Chi Squared	1,952.415	1,667.981	1,791.712	1,582.592	2,429.434	2,111.817
Baseline vs. Saturated Chi Squared	17,220.346	16,653.076	16,778.748	16,245.838	22,439.549	21,732.562
Aikake Information Criteria (AIC)	189,982.019	179,705.734	189,966.350	179,763.757	242,256.157	229,310.810
Bayesian Information Criteria (BIC)	190,404.505	180,104.418	190,388.811	180,162.418	242,695.869	229,725.750

Table A4.2: Kenya Confirmatory Factor Analysis: Loadings for Descriptive Items of Alternate Subpopulations

Items	CFA Subpop: Model 1 (Orig)	CFA Subpop: Model 2 (No Des Prob)	EFA Subpop Model 1 (Orig)	EFA Subpop: Model 2 (No Des Prob)	WRA Subpop: Model 1 (Orig)	WRA Subpop: Model 2 (No Des Prob)
Descriptive						
If a woman earns money, it will cause problems in her marriage.	0.28	--	0.29	--	0.31	--
Only men make decisions about household income and expenses.	0.56	0.55	0.59	0.59	0.57	0.57
Husbands make the final decision about how many children to have.	0.54	0.53	0.54	0.53	0.55	0.54
Men make the final decision about their wife (or partner) using family planning methods.	0.45	0.44	0.45	0.44	0.51	0.50
If a woman disobeys her husband, she is sent back to her parents (or sent away).	0.43	0.43	0.47	0.47	0.48	0.48
Only women do the cooking, cleaning, and caring of children.	0.54	0.55	0.53	0.54	0.53	0.54
Women stop working when they get married.	0.54	0.53	0.53	0.51	0.55	0.53
Girls stop going to school if they get pregnant.	0.49	0.49	0.48	0.48	0.48	0.48
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	0.61	0.62	0.62	0.63	0.61	0.62
If there is only enough money for one cell phone for the household, the husband owns it.	0.55	0.56	0.53	0.54	0.53	0.54

Table A4.3: Kenya Confirmatory Factor Analysis: Loadings for Injunctive Items of Alternate Subpopulations

Items	CFA Subpop: Model 1 (Orig)	CFA Subpop: Model 2 (No Des Prob)	EFA Subpop Model 1 (Orig)	EFA Subpop: Model 2 (No Des Prob)	WRA Subpop: Model 1 (Orig)	WRA Subpop: Model 2 (No Des Prob)
Injunctive						
A woman should not work outside the home to keep peace in her marriage.	0.51	0.50	0.50	0.50	0.53	0.53
Only men should make decisions about income and expenses.	0.69	0.69	0.68	0.68	0.69	0.69
Husbands should make the final decision about how many children to have.	0.64	0.64	0.63	0.63	0.66	0.65
Men should make the final decision about their wife using family planning.	0.56	0.56	0.57	0.56	0.60	0.60
If a woman disobeys her husband, she should be sent back to her parents (or sent away).	0.49	0.49	0.53	0.53	0.54	0.54
Only women should do the cooking, cleaning, and caring of children.	0.61	0.61	0.59	0.59	0.59	0.60
Women should stop working when they get married.	0.59	0.58	0.58	0.57	0.60	0.60
Girls should stop going to school if they get pregnant	0.57	0.57	0.57	0.57	0.58	0.58
Husbands should make the final decisions about buying major household items (e.g., television, bicycle, cell phone).	0.65	0.66	0.64	0.65	0.63	0.64
If there is only enough money for one cell phone for the household, the husband should own it.	0.54	0.55	0.56	0.57	0.54	0.55

Exploratory Factor Analysis

Nigeria

Using an eigenvalue threshold of two, Fraym's analysis yielded a 2-factor model encompassing all 20 items. This model was excluded because it was less parsimonious and interpretable than our CFA model, further confirming that the solution achieved by the CFA was a superior model.

The factors themselves do not have a straightforward interpretation. However, it is noteworthy that items related to the acceptability of working outside the home load separately from the other items. This finding aligns with our CFA results, where one of these items did not sufficiently load onto the combined main factor.

Table A5: Nigeria Exploratory Factor Analysis: Alternate G-NORM Results

Items	F1 Loadings	F2 Loadings	Unique-ness
Only men make decisions about household income and expenses. (D)	0.41		0.59
Only men should make decisions about income and expenses. (I)	0.44		0.54
Husbands make the final decision about how many children to have. (D)	0.58		0.55
Husbands should make the final decision about how many children to have. (I)	0.62		0.53
Men make the final decision about their wife (or partner) using family planning methods. (D)	0.51		0.63
Men should make the final decision about their wife using family planning. (I)	0.56		0.59
Only women do the cooking, cleaning, and caring of children. (D)	0.57		0.58
Only women should do the cooking, cleaning, and caring of children. (I)	0.54		0.56
Girls stop going to school if they get pregnant. (D)	0.44		0.77
Girls should stop going to school if they get pregnant. (I)	0.45		0.74
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone). (D)	0.78		0.49
Husbands should make the final decisions about buying major household items (e.g., television, bicycle, cell phone). (I)	0.79		0.48
If there is only enough money for one cell phone for the household, the husband owns it. (D)	0.70		0.63
If there is only enough money for one cell phone for the household, the husband should own it. (I)	0.72		0.60
If a woman earns money, it will cause problems in her marriage. (D)		0.64	0.68
A woman should not work outside the home to keep peace in her marriage. (I)		0.67	0.55
If a woman disobeys her husband, she is sent back to her parents (or sent away). (D)		0.61	0.61
If a woman disobeys her husband, she should be sent back to her parents (or sent away). (I)		0.63	0.64
Women stop working when they get married. (D)		0.73	0.51
Women should stop working when they get married. (I)		0.75	0.49
Final Cronbach's Alpha (88.2)	**87.5**	**78.1**	
Proportion of Variance Explained		**47.0%**	

Kenya

Using an eigenvalue threshold of two, Fraym's analysis yielded a 2-factor model encompassing 16 items. Two items were dropped in pairs as per social norms theory—descriptive and injunctive norms related to men being responsible for income and expenses, and equivalent norms for women being sent away for disobeying parents—because at least one of these items did not load onto any factor. This model was also excluded due to its lack of parsimony and reduced interpretability compared to the CFA model, further confirming that the CFA solution was a superior model.

Table A6: Kenya Exploratory Factor Analysis: Alternate G-NORM Results

Items	F1 Loadings	F2 Loadings	Unique-ness
Only women do the cooking, cleaning, and caring of children. (D)	0.58		0.61
Only women should do the cooking, cleaning, and caring of children. (I)	0.63		0.53
Husbands make the final decisions about buying major household items (e.g., television, bicycle, cell phone). (D)	0.74		0.45
Husbands should make the final decisions about buying major household items (e.g., television, bicycle, cell phone). (I)	0.77		0.40
If there is only enough money for one cell phone for the household, the husband owns it. (D)	0.77		0.48
If there is only enough money for one cell phone for the household, the husband should own it. (I)	0.82		0.42
Girls stop going to school if they get pregnant. (D)	0.49		0.70
Girls should stop going to school if they get pregnant. (I)	0.54		0.59
Husbands make the final decision about how many children to have. (D)		0.53	0.62
Husbands should make the final decision about how many children to have. (I)		0.63	0.46
Men make the final decision about their wife (or partner) using family planning methods. (D)		0.74	0.54
Men should make the final decision about their wife using family planning. (I)		0.76	0.45
If a woman earns money, it will cause problems in her marriage. (D)		0.57	0.76
A woman should not work outside the home to keep peace in her marriage. (I)		0.67	0.58
Women stop working when they get married. (D)		0.66	0.56
Women should stop working when they get married. (I)		0.67	0.49
Final Cronbach's Alpha (86.3)	**83.6**	**80.8**	
Proportion of Variance Explained		**52.5%**	