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Religious, Environmental, Economic and Behavioral Determinants of Ethical Clothing Consumption in Morocco: A Cross-Sectional Analytical Study

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Abstract

Introduction: Ethical clothing consumption combines environmental, social, economic, moral and cultural dimensions. In Arab-Muslim societies, religious beliefs may also structure consumption choices.

Objective: To identify the factors associated with self-reported purchase of ethical clothing in Morocco and to assess the robustness of the associations using several complementary statistical approaches.

Methods: Cross-sectional study among 104 Moroccan participants. The primary outcome was Q25, self-reported purchase of ethical clothing. Associations were examined using conventional logistic regression, Firth penalized regression, and modified Poisson regression with robust variance. Missing data, discrimination by ROC curves, the Brier score, internal bootstrap validation (1,000 replications), the Q70×Q20 interaction, and an E-value were examined. A targeted bibliographic update, limited to PubMed and Scopus, was performed for 2020–2025 to contextualize the observed determinants.

Results: Among 102 respondents, 76 (74.5%) reported purchasing ethical clothing. The main model included 91 complete cases (67 buyers, 24 non-buyers). Islamic beliefs

guiding consumption choices were strongly associated with Q25: conventional aOR=7.56 (95% CI 2.42–23.67; $p<0.001$), Firth aOR=6.73 (95% CI 2.31–20.88; $p<0.001$), and robust aPR=1.98 (95% CI 1.18–3.33; $p=0.010$). Ecological purchasing remained associated in the robust Poisson model (aPR=1.24; 95% CI 1.00–1.55; $p=0.048$), unlike Q81 (aPR=1.35; 95% CI 0.91–1.99; $p=0.132$). The logistic model had an apparent AUC of 0.827 (bootstrap 95% CI 0.732–0.908) and an optimism-corrected AUC of 0.809. The Q70×Q20 interaction was borderline: $p=0.048$ in conventional logistic regression and $p=0.055$ with Firth. The E-value for the Q70 aPR was 3.38, and 1.64 for the lower bound of its 95% CI.

Conclusion: Ethical clothing consumption appears to be multidimensional. The association with Islamic beliefs is consistent across logistic, penalized, and prevalence models. The environmental dimension also contributes to the behavior, while sensitivity analyses call for cautious interpretation given the cross-sectional, self-reported nature of the data and the sample size.

Keywords: ethical consumption; sustainable fashion; clothing; consumer behavior; religiosity; halal fashion; environment; Firth regression; prevalence ratio; Morocco.

1. Introduction

The clothing industry occupies a central place in contemporary debates on sustainable consumption. Beyond price, quality and comfort, clothing choices may incorporate environmental impact, production conditions, product origin, durability, and alignment with consumer values. Recent work shows that sustainable fashion intentions and practices are shaped by environmental values, personal and social norms, trust, attitudes, and economic trade-offs [9,11,12,16]. The 2020–2025 Scopus literature confirms the growing scale of this field, with a strong presence of work relating to consumer behavior, sustainability, and the circular economy.

Ethical consumption is multidimensional. In Arab-Muslim societies, religious values may contribute to shaping consumption norms and interact with environmental concerns and economic constraints. Recent literature suggests that religiosity can act directly, but also indirectly through personal values, environmental attitudes, subjective norms, trust, and perceived behavioral control [13–15]. In the clothing domain, recent Scopus studies show that religious commitment can moderate the intention to purchase hijab clothing [17], while in halal fashion, self-congruence, trust, and brand image contribute to shaping consumer responses [18]. These findings support the interest of jointly studying religious, environmental, and behavioral dimensions.

In Morocco, an ethical consumption questionnaire was developed and validated, then used to study barriers to ethical clothing consumption [2,3]. Previous work relied mainly on descriptive and bivariate analyses. The present study extends this line of research through multivariate modeling, robustness analyses adapted to small samples, and direct estimation of prevalence ratios. A highly targeted Scopus search combining Morocco, religiosity/Islam/Halal, fashion/ethical consumption, and consumer behavior identified only four documents for 2020–2025, including one directly relevant Moroccan behavioral article [19]. This low yield suggests that the specific intersection between religious values and ethical clothing consumption remains poorly documented in Morocco.

Objective

To identify the factors associated with self-reported purchase of ethical clothing and to assess the stability of these associations across several complementary analytical strategies.

2. Materials and Methods

2.1. Design, population, and questionnaire

Descriptive and analytical cross-sectional observational study based on a questionnaire survey among 104 Moroccan participants. The questionnaire comprised 87 questions and follows on from the previously developed Moroccan ethical consumption instrument. The report follows STROBE principles applicable to cross-sectional studies.

2.2. Primary outcome

The primary outcome Q25 was: “Do you buy ethical clothing (that respects your personal values as well as the values of your religion, society, and environment)?” It was coded Yes=1, No=0. This is a self-reported behavior.

2.3. Main explanatory variables

The main model included Q70 (consumption choices guided by Islamic beliefs), Q20 (purchase of organic or environmentally friendly clothing), and Q81 (ability to identify an offer incompatible with one's ethical principles). Variables conceptually very close to Q25, such as preference for ethical labels, were not entered into the main model in order to limit conceptual circularity.

2.4. Missing data

No imputation was performed. Q25 was available for 102/104 participants, Q20 for 104/104, Q70 for 95/104, and Q81 for 91/104. The main model was based on 91 complete cases. Complete and incomplete cases were compared on sex, age, educational level, and Q25 when available.

2.5. Logistic regressions and Firth analysis

Univariate logistic regressions estimated crude ORs. The conventional multivariate model Q25~Q70+Q20+Q81 was then fitted. Given the small sample size and the limited number of non-events, Firth penalized logistic regression using the same specification served as a sensitivity analysis; Firth estimates are reported with penalized profile 95% CIs.

2.6. Discrimination and performance

Model discrimination was assessed using the ROC curve and the area under the curve (AUC). A stratified bootstrap 95% CI was calculated for the apparent AUC. The Brier score was used as an overall measure of probabilistic error.

2.7. Internal bootstrap validation

Internal validation with 1,000 bootstrap replications estimated the optimism of the AUC and the Brier score. At each replication, the same three-predictor model was refitted on a sample drawn with replacement, then evaluated in both the bootstrap sample and the original sample. The mean difference constituted the optimism, which was subtracted from the apparent performance.

2.8. Exploratory interaction

A Q70×Q20 interaction was added to the main model to explore whether the association of Islamic beliefs with Q25 varied according to ecological purchasing. This non-primary analysis was performed using conventional logistic regression and Firth regression.

2.9. Prevalence ratios

Given the high prevalence of Q25, modified Poisson regression with robust sandwich variance was used to estimate adjusted prevalence ratios (aPR) and their 95% CIs, using the same Q70+Q20+Q81 specification.

2.10. Sensitivity to unmeasured confounding

For the main Q70–Q25 association, an E-value was calculated from the robust aPR and the bound of its 95% CI closest to 1. This measure is interpreted as a sensitivity analysis and not as proof of the absence of residual confounding.

2.11. Statistical threshold

Tests were two-sided and the conventional threshold was $p < 0.05$. Exploratory analyses, particularly the interaction, were interpreted taking into account imprecision and potential multiplicity.

2.12. Ethical considerations

Participants' agreement and informed consent were obtained through the questionnaire prior to their participation in the study. Participants were also informed that the data collected would be treated confidentially and anonymously.

2.13. Targeted bibliographic update

To contextualize the empirical findings without turning the study into a standalone systematic review, a targeted bibliographic update was limited to two complementary databases, PubMed and Scopus, for the period from January 1, 2020 to December 31, 2025. PubMed was queried using

several combinations of terms relating to sustainable/ethical fashion, consumer behavior, religiosity, Islam, and Halal. The four available exports totaled 10,600 raw occurrences; consolidation by PMID, then DOI and normalized title, produced 5,529 unique bibliographic references. In Scopus, TITLE-ABS-KEY queries explored the same conceptual axes, with a deeper query A dedicated to ethical/sustainable consumption and fashion/clothing. This query identified 699 documents. After title and abstract screening, adjudication of uncertain cases, and duplicate control, 423 references were retained at this stage for contextualization (377 directly relevant studies and 46 reviews or syntheses), 276 were excluded, and no case remained undetermined. The PubMed–Scopus cross-referencing relied primarily on DOI, then normalized title, with verification of very similar titles. The numbers of results from the different search equations are not summed as if they represented independent publications, as the queries overlap. This approach constitutes a targeted bibliographic search for contextualization and not an exhaustive PRISMA flow.

On the bibliographic front, the four PubMed exports provided 10,600 raw occurrences, consolidated into 5,529 unique references. In Scopus A, 699 documents were identified; 423 were retained after title/abstract screening and adjudication (377 Include and 46 Include-review), 276 were excluded, and no case remained undetermined. These figures describe the bibliographic contextualization process and do not constitute a PRISMA diagram for an independent systematic review.

3. Results

3.1. Description of the population and ethical consumption

The study included 104 participants, of whom 58 were women (55.8%) and 46 were men (44.2%). The 18–25 and 26–40 age groups each accounted for 46.2% of the sample. The educational level was high: 48.1% held a Master's degree and 31.7% a Doctorate. Among the 102 participants who answered Q25, 76 (74.5%) reported purchasing ethical clothing. Ecological/organic purchasing concerned 45/104 (43.3%), ethical labels 48/101 (47.5%), local purchasing 56/102 (54.9%), and high price as a barrier 59/101 (58.4%).

3.2. Missing data and complete cases

Table 1. Data availability for the main model variables

Variable	Available	Missing	% missing
Q25 – ethical purchase	102	2	1.9
Q20 – ecological purchase	104	0	0.0
Q70 – Islamic beliefs	95	9	8.7
Q81 – detection of unethical offer	91	13	12.5
Complete model	91	13	12.5

As shown in Table 1, Q25 was available for 102/104 participants (98.1%), Q20 for 104/104 (100%), Q70 for 95/104 (91.3%), and Q81 for 91/104 (87.5%). The main model was thus based on 91 complete cases (87.5% of the sample). The 91 complete cases did not differ statistically from the 13 incomplete cases in terms of sex ($p=0.296$), age ($p=0.234$), or educational level ($p=0.950$). Among participants who answered Q25, its distribution also did not differ between complete and incomplete cases (Fisher's exact test, $p=0.725$). These comparisons do not reveal any obvious difference between subjects included in and excluded from the model, without, however, fully ruling out a bias related to missing data.

3.3. Univariate associations

Table 2. Univariate associations with self-reported purchase of ethical clothing (Q25)

Factor	OR	95% CI	p
Ethical labels	11.90	3.27–43.24	<0.001
Originality of ethical clothing	9.78	3.05–31.35	<0.001
Islamic beliefs (Q70)	7.64	2.71–21.50	<0.001

Detection of unethical offer (Q81)	4.07	1.42–11.68	0.009
Ecological/organic purchase (Q20)	3.51	1.27–9.72	0.015
Purchasing power	3.02	1.11–8.20	0.030
High price	1.42	0.57–3.51	0.454

3.4. Multivariate models: logistic, Firth, and robust Poisson

Table 3. Comparison of adjusted estimates from conventional logistic regression, Firth penalized regression, and modified Poisson regression with robust variance

Factor	Conventional aOR (95% CI)	p	Firth aOR (95% CI)	p	Robust aPR (95% CI)	p
Q70	7.56 (2.42–23.67)	<0.001	6.73 (2.31–20.88)	<0.001	1.98 (1.18–3.33)	0.010
Q20	3.10 (0.97–9.93)	0.057	2.84 (0.97–9.19)	0.058	1.24 (1.00–1.55)	0.048
Q81	2.76 (0.81–9.36)	0.104	2.65 (0.81–8.65)	0.107	1.35 (0.91–1.99)	0.132

Univariate analyses are presented in Table 2. The strongest associations concerned ethical labels (OR=11.90), the originality of ethical clothing (OR=9.78), and Islamic beliefs guiding consumption choices (Q70; OR=7.64), all with $p<0.001$. Q81, Q20, and consideration of purchasing power were also associated with Q25 in crude analysis. After adjustment (Table 3), Q70 remained the factor most consistently associated with Q25: aOR=7.56 (95% CI 2.42–23.67) in conventional logistic regression, aOR=6.73 (2.31–20.88) with Firth, and aPR=1.98 (1.18–3.33) with robust Poisson. The shift from OR to aPR strongly reduces the numerical magnitude, which is expected with a frequent outcome, but does not change either the direction or the main statistical conclusion. For Q20, the association was borderline in logistic/Firth regression ($p=0.057$ – 0.058) and just reached the conventional threshold with robust Poisson (aPR=1.24; 95% CI 1.00–1.55; $p=0.048$). Q81 remained positively associated but not significant after adjustment (aPR=1.35; 95% CI 0.91–1.99; $p=0.132$).

3.5. Discrimination, ROC, and internal validation

As illustrated in Figure 1, the conventional logistic model had an apparent AUC of 0.827 (bootstrap 95% CI 0.732–0.908), consistent with good discrimination within the analyzed sample. The Firth model produced the same apparent AUC (0.827), while the robust Poisson model had an AUC of 0.813. The apparent Brier score was 0.144. After 1,000 bootstrap replications, the mean optimism of the AUC was 0.019, giving a corrected AUC of 0.809; the corrected Brier score was 0.161. The small decrease in AUC after correction suggests limited optimism. These performances nonetheless stem from internal validation and should not be equated with external validation of the model.

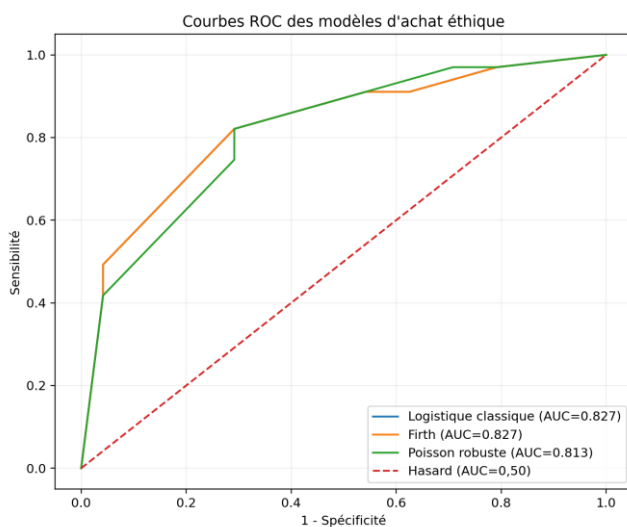


Figure 1. ROC curves of the multivariate models. Logistic and Firth models: AUC=0.827; robust Poisson: AUC=0.813. The bootstrap 95% CI of the logistic AUC is 0.732–0.908

3.6. Exploratory Q70 × Q20 interaction

Table 4. Prevalence of ethical purchasing according to combined profiles of Islamic beliefs (Q70) and ecological purchasing (Q20)

Q70	Q20	Ethical buyers / N	Prevalence (%)
No	No	6/15	40.0
No	Yes	3/8	37.5
Yes	No	25/34	73.5

Yes	Yes	33/34	97.1
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As shown in Table 4, the prevalence of Q25 was 40.0% among Q70–/Q20– participants, 37.5% among Q70–/Q20+, 73.5% among Q70+/Q20–, and 97.1% among Q70+/Q20+. This descriptive contrast suggests a particularly high prevalence when Q70 and Q20 are simultaneously present. In the conventional logistic model, the OR of the Q70×Q20 interaction term was 17.48 (95% CI 1.02–299.50; $p=0.048$). In the Firth penalized analysis, the point estimate of the interaction OR was 11.28, and the penalized likelihood ratio test gave $p=0.055$. Because of the small cell sizes in some categories, the extremely wide CI, and the instability of significance depending on the method, this interaction must be considered exploratory and inconclusive.

3.7. E-value

For Q70, the robust aPR presented in Table 3 was 1.98 (95% CI 1.18–3.33). The E-value for the point estimate was 3.38, and 1.64 for the lower bound of the 95% CI. The point estimate therefore shows some theoretical robustness to unmeasured confounding, but the value of 1.64 for the CI bound shows that a confounder of more moderate magnitude could suffice to shift the interval to the null value. This analysis should be interpreted as a sensitivity quantification, and not as proof of the absence of residual confounding.

4. Discussion

4.1. Main result

The main result, summarized in Table 3, is the consistency of the association between Islamic beliefs guiding consumption choices and ethical purchasing across the different methods. The conventional aOR was 7.56, the Firth aOR 6.73, and the robust aPR 1.98. The persistence of the association across the three approaches strengthens its statistical robustness, without allowing a causal interpretation. This finding is consistent with PubMed studies showing a role of green religiosity in green values and behaviors [13–15]. It is also compatible with the Scopus literature specific to Muslim fashion: among 533 Iranian women following hijab clothing Instagram pages, religious commitment moderated the relationship between electronic word-of-mouth and purchase intention, which was associated with online purchasing behavior [17].

4.2. Environmental dimension

As shown in Table 3, ecological/organic purchasing (Q20) was associated with Q25 in univariate analysis and retained a positive direction after adjustment. The association just reached the conventional threshold in the robust Poisson model (aPR=1.24; 95% CI 1.00–1.55; $p=0.048$). This signal aligns with the findings of Hong et al. [11] and Ngo et al. [12], as well as with the Scopus literature on sustainable fashion, where environmental concerns, attitudes, perceived risk, price, and willingness to pay contribute to consumption decisions [9,16]. Overall, this argues for a multidimensional reading rather than an opposition between moral, religious, ecological, and economic motivations.

4.3. Discrimination and internal robustness

The performances presented in Figure 1 support satisfactory internal discrimination: the apparent AUC was 0.827 and the bootstrap-corrected AUC 0.809. The closeness of these two values suggests relatively limited optimism. However, the objective of the present work remains primarily associative and explanatory; the ROC curve should therefore not be interpreted as demonstrating the predictive or clinical usefulness of the model. Validation in an independent sample would be needed before any predictive use.

4.4. Religion–environment interaction

Table 4 shows that the prevalence of Q25 reached 97.1% when both Q70 and Q20 were present, compared with 40.0% when both were absent. Despite this descriptive contrast, the interaction must remain exploratory: its marginal significance in conventional logistic regression disappeared with Firth, and the confidence intervals were very wide. The hypothesis of a religion–environment link nonetheless remains plausible in light of the literature on green religiosity and the TPB [13–15]. The Scopus results add that, in religiously contextualized fashion, trust, identity congruence, and religious commitment can shape consumer responses [17,18]. Our data, however, do not allow us to establish a comparable mediation or moderation mechanism.

4.5. Sensitivity to unmeasured confounding

The E-value of 3.38 for the Q70 aPR indicates that an unmeasured confounder would need to show relatively strong associations with both the exposure and the outcome to fully explain the point estimate. The E-value of 1.64 for the 95% CI bound is more modest and calls for a cautious interpretation.

4.6. Conceptual overlap between Q25 and Q70

Q25 explicitly includes, in its wording, respect for religious and environmental values. Q70 precisely measures the influence of Islamic beliefs on consumption choices. Part of the observed association may therefore reflect a conceptual overlap between outcome and predictor. This point should be considered a major limitation and motivates, in future work, the use of a behavioral outcome constructed independently of religiosity. Recent PubMed studies generally use distinct constructs for religiosity, attitudes, norms, intentions, and behaviors [13–15], which is a relevant methodological direction for a future Moroccan validation.

4.7. Positioning relative to the 2020–2025 PubMed–Scopus literature

The targeted search in PubMed and Scopus confirms that the determinants of sustainable or ethical clothing consumption are structured around several converging families. The sustainable fashion literature highlights attitudes, social norms, environmental concerns, knowledge, trust, price, perceived value, and purchase intentions [9,11,12,16]. Work on religiosity and consumption similarly shows that religious values can act as a direct determinant, an antecedent of personal values, or a moderating factor of pro-environmental behaviors and product choices [10,13–15,17,18]. The Scopus A corpus, specifically dedicated to ethical/sustainable consumption and fashion, provided 699 documents for 2020–2025; after title/abstract screening and adjudication, 423 references were judged relevant for contextualization. These results reinforce the multidimensional interpretation of Q25, while highlighting that theoretical constructs, populations, and outcomes vary considerably from one study to another.

4.8. Contribution of the Moroccan context and originality of the study

Data specifically devoted to Morocco remain far less abundant than the international literature. The study by Zejjari and Benhayoun [19], conducted among 234 Moroccan consumers, shows that subjective norms, anticipated emotions, animosity, and social influences contribute to boycott intentions, viewed as a form of consumer activism. This emerging Moroccan literature supports the importance of the sociocultural context but does not directly address the question raised here regarding ethical clothing purchasing. The present work thus makes a specific contribution by combining, within a single model, religious, environmental, and behavioral dimensions, and then testing the robustness of the main association through conventional logistic regression, Firth penalization, and robust Poisson regression. The PubMed–Scopus search serves to

situate these results within the recent state of knowledge; it should not be interpreted as an exhaustive estimate of worldwide scientific output.

4.9. Strengths

Strengths include the use of an instrument contextualized to Morocco, the combination of logistic, penalized, and prevalence analyses, the explicit examination of missing data, ROC evaluation, internal bootstrap validation, interaction analysis, and a sensitivity analysis for unmeasured confounding.

4.10. Limitations

The sample is small, young, highly educated, and geographically concentrated; it is not representative of the Moroccan population. Behaviors are self-reported and subject to social desirability bias. The cross-sectional design precludes any causal conclusion. The measure of religiosity relies on a single item rather than a multidimensional scale. Q25 and Q70 show conceptual overlap that may amplify their association. The interaction analyses are underpowered, and the good discrimination observed is internal, requiring external validation. Finally, the bibliographic update was deliberately limited to PubMed and Scopus and aimed at contextualizing the manuscript rather than an exhaustive systematic review; despite deduplication and the detailed Scopus A screening, it therefore cannot claim to be exhaustive of the entire international literature.

5. Conclusion

Ethical clothing consumption appears multidimensional in this Moroccan sample. Islamic beliefs guiding consumption choices constitute the factor most consistently associated with Q25, with an association robust across the conventional and Firth logistic models and the prevalence ratio estimate. The environmental dimension also contributes to the observed behavior. The 2020–2025 PubMed–Scopus bibliographic contextualization shows that these findings fit within a recent literature in which values, attitudes, norms, environmental concerns, trust, price, and religiosity interact in shaping intentions and sustainable consumption behaviors. Given the cross-sectional design, the sample size, and the conceptual overlap between Q25 and Q70, these results should be confirmed in larger Moroccan samples, using distinct and validated measures of religiosity, intention, and purchasing behavior.

Ethical approval

This study is a scoping review based on previously published literature and publicly available institutional documents. It did not involve human participants, identifiable human data, or animal subjects. Therefore, ethical approval and informed consent were not required.

Conflict of interest

The authors declare that they have no conflicts of interest

Data availability statement

All respondents were informed that their data would be used in anonymized form. The data supporting the findings of this study are derived from the published sources cited in the reference list, as well as from the publicly available institutional documents referenced in the manuscript.

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