

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Diferencias de sexo en el autocuidado de los pies entre adultos con diabetes en Cañar, Ecuador.

Diferenças de sexo no autocuidado dos pés entre adultos com diabetes em Cañar, Equador.

Fecha de presentación: 10/05/2026, Fecha de Aceptación: 30/07/2026, Fecha de publicación: 01/09/2026



 **Gloria Alexandra Latacela Lligui** ¹

E-Mail: galatacelall@ucacue.edu.ec

ORCID: <https://orcid.org/0000-0001-8030-8635>

 **Vanessa de Los Ángeles Belloso de Noriega** ²

E-Mail: vanebeloso@gmail.com

ORCID: <https://orcid.org/0009-0000-5030-5409>

¹ Universidad de Zulia, Maracaibo - Venezuela.

² Universidad Católica de Cuenca, Azogues - Ecuador.

Cita sugerida (APA, séptima edición)

Latacela-Lligui, G.A., Belloso de Noriega, V. (2026) Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador. *Revista Ciencia & Sociedad*, 6(3), 431 - 443

ABSTRAC

Background: Foot self-care is central to preventing diabetes-related ulcers and amputations, yet evidence on sex differences in Andean populations remains limited.

Objective: To examine sex differences in foot self-care practices among adults with diabetes in Cañar, Ecuador, and determine whether any difference persisted after accounting for sociodemographic, clinical, knowledge, and attitude variables. **Methods:** A cross-sectional secondary analysis was conducted using complete data from 228 adults with diabetes (95 men and 133 women). **Results:** Participants had a mean age of 59.8 years (SD=10.4), and 58.3% were women. Women had a higher mean practice score than men. High practice was observed in 41.4% of women and 27.4% of men. After adjustment for age, diabetes duration, residence, primary caregiver, foot lesions, study site, knowledge, and attitudes, women had a 0.35-point higher practice score and a 1.56-fold higher prevalence of high practice. **Conclusion:** Women demonstrated modestly better foot self-care than men. Sex-responsive diabetes education, with strengthened behavioral support for men and site-specific implementation, may help reduce preventable foot complications in Cañar.

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Palabras Clave: Diabetes mellitus; Diabetic foot; Foot self-care; Health behavior.

RESUMEN

Antecedentes: El autocuidado de los pies es fundamental para prevenir las úlceras y amputaciones relacionadas con la diabetes; sin embargo, la evidencia sobre las diferencias según el sexo en poblaciones andinas sigue siendo limitada. **Objetivo:** Examinar las diferencias según el sexo en las prácticas de autocuidado de los pies entre adultos con diabetes en Cañar, Ecuador, y determinar si dichas diferencias persistían después de considerar variables sociodemográficas, clínicas, de conocimiento y de actitud. **Métodos:** Se realizó un análisis secundario de corte transversal utilizando datos completos de 228 adultos con diabetes (95 hombres y 133 mujeres). **Resultados:** Los participantes tuvieron una edad media de 59,8 años (DE = 10,4), y el 58,3 % fueron mujeres. Las mujeres presentaron una puntuación media de prácticas de autocuidado superior a la de los hombres. Se observó un nivel alto de prácticas en el 41,4 % de las mujeres y en el 27,4 % de los hombres. Después de ajustar por edad, duración de la diabetes, lugar de residencia, cuidador principal, lesiones en los pies, sitio de estudio, conocimientos y actitudes, las mujeres presentaron una puntuación de prácticas 0,35 puntos superior y una prevalencia 1,56 veces mayor de un nivel alto de prácticas de autocuidado. **Conclusión:** Las mujeres demostraron un autocuidado de los pies moderadamente mejor que los hombres. Una educación diabetológica sensible a las diferencias por sexo, con un mayor apoyo conductual dirigido a los hombres y una implementación específica según el sitio, podría contribuir a reducir las complicaciones prevenibles de los pies en Cañar.

Keywords: Diabetes mellitus; Pie diabético; Autocuidado de los pies; Conducta de salud.

RESUMO

Introdução: O autocuidado dos pés é fundamental para a prevenção de úlceras e amputações relacionadas ao diabetes; no entanto, as evidências sobre diferenças segundo o sexo em populações andinas permanecem limitadas. **Objetivo:** Examinar as diferenças segundo o sexo nas práticas de autocuidado dos pés entre adultos com diabetes em Cañar, Equador, e determinar se essas diferenças persistiam após o controle de variáveis sociodemográficas, clínicas, de conhecimento e de atitude. **Métodos:** Foi realizada uma análise secundária transversal utilizando dados completos de 228 adultos com diabetes (95 homens e 133 mulheres). **Resultados:** Os participantes apresentaram idade média de 59,8 anos (DP = 10,4), e 58,3% eram mulheres. As mulheres apresentaram uma pontuação média de práticas de autocuidado superior à dos homens. Um nível elevado de práticas foi observado em 41,4% das mulheres e em 27,4% dos homens. Após o ajuste por idade, duração do diabetes, local de residência, cuidador principal, lesões nos pés, local do estudo, conhecimentos e atitudes, as mulheres apresentaram uma pontuação de práticas 0,35 ponto maior e uma prevalência 1,56 vez maior de um nível elevado de práticas de autocuidado. **Conclusão:** As mulheres demonstraram um autocuidado dos pés moderadamente melhor do que os homens. Uma educação em diabetes sensível às diferenças entre os sexos, com maior apoio comportamental direcionado aos homens e implementação específica de acordo com o local, pode contribuir para reduzir complicações evitáveis nos pés em Cañar.

Palavras-chave: Diabetes mellitus; Pé diabético; Autocuidado dos pés; Comportamento de saúde.

===== O =====

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

INTRODUCTION

Diabetes mellitus is a major and growing global health challenge. The International Diabetes Federation estimates that the number of adults living with diabetes will continue to rise, increasing the burden of preventable microvascular, neurological, and vascular complications (International Diabetes Federation, 2025). Contemporary standards of diabetes care emphasize routine foot assessment, risk stratification, patient education, and daily preventive behaviors as essential components of comprehensive management (American Diabetes Association Professional Practice Committee, 2026).

Diabetes-related foot ulcers are among the most disabling complications of the disease. They emerge through interacting pathways that include peripheral neuropathy, peripheral arterial disease, repeated mechanical stress, skin injury, infection, and delayed healing (Armstrong et al., 2023). International guidance recommends daily inspection, appropriate hygiene, careful nail and skin care, avoidance of barefoot walking, suitable footwear, and rapid consultation when lesions appear (American Diabetes Association Professional Practice Committee, 2026; Bus et al., 2024). Although structured education alone may not prevent every ulcer, education integrated with clinical surveillance and access to multidisciplinary care is an important element of prevention (Dorresteijn et al., 2014; Jeffcoate et al., 2018).

The relevance of prevention is particularly pronounced in resource-constrained and geographically dispersed settings. Studies in Andean Ecuador have documented a substantial burden of type 2 diabetes and metabolic risk (Baldeón et al., 2021), while community-based research in rural Ecuador has identified diabetes-related foot disorders that may remain unrecognized outside specialized services (Del Brutto et al., 2016). Population evidence from Ecuador also indicates sex disparities in diabetes and obesity, suggesting that prevention strategies should consider how biological sex, social roles, healthcare access, and health behaviors intersect (Puig-García et al., 2023).

International evidence shows that adequate foot self-care is far from universal. A recent systematic review and meta-analysis reported important gaps in foot self-care practice across African settings (Atalay et al., 2025), while reviews and cross-sectional studies from multiple countries have identified deficits in daily inspection, footwear practices, skin care, and timely professional consultation (Algethami et al., 2024; Alsalamah et al., 2025; Chiwanga & Njelekela, 2015; Jayaweera et al., 2026; Omotosho et al., 2024; Pourkazemi et al., 2020; Taksande et al., 2017; Untari et al., 2024). Some studies suggest that women engage more consistently in preventive foot-care behaviors than men (Jia et al., 2022; Pourkazemi et al., 2020), but results vary by setting and measurement approach. Evidence from Ecuadorian adults is scarce, especially in the Andean province of Cañar.

The present study therefore examined sex differences in foot self-care among adults with diabetes in Cañar, Ecuador. We hypothesized that women would show higher practice scores and a higher prevalence of high foot self-care than men. A secondary objective was to determine whether any observed difference remained after adjustment for age, diabetes duration, residence, caregiver availability, foot lesions, study site, knowledge, and attitudes.

METHODS

Study design

This article reports a cross-sectional secondary analysis of an existing database on diabetic foot-related knowledge, attitudes, and self-care practices. The present study focused on sex differences in foot self-care and retained the original structure of the database. Reporting was organized according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for cross-sectional studies.

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Participants and eligibility

The analytical sample comprised 228 adults with diabetes. The database coded 95 participants as men and 133 as women, indicating a female proportion of 58.3%. The age range was 37 to 85 years, and time since diagnosis ranged from 1 to 33 years. Because this was a secondary analysis, eligibility criteria were reconstructed from the available file structure: participants were adults with diabetes with complete information on sociodemographic variables and all foot self-care items. Authors should verify the original inclusion and exclusion criteria, response rate, and whether the source population included only type 2 diabetes or mixed diabetes diagnoses.

Variables and measures

The dataset included sociodemographic and clinical variables: age (years), sex, marital status, place of residence, educational level, occupation, availability of a primary caregiver, the presence of foot lesions, study site, and time since diabetes diagnosis in years. Age and duration were analyzed as continuous variables and additionally rescaled in regression models as age per 10 years and duration per 5 years to improve interpretability.

Knowledge domain: Knowledge was measured using 10 dichotomous items (CON1–CON10), each coded 0/1 in the source database. The total knowledge score represented the sum of these items and ranged from 2 to 10 in the analyzed sample, with a sample mean of 6.04 (SD = 1.91). The database also included an ordinal knowledge category variable coded in three levels (1–3). Because the codebook for these levels was unavailable, category labels are reported as database codes in the tables.

Attitude domain: Attitudes were measured using five dichotomous items (ACT1–ACT5), also coded 0/1. The total attitude score ranged from 0 to 5 in the sample, with a mean of 4.26 (SD 1.15). A secondary ordinal attitude variable was available with two coded levels (1–2). As with the knowledge classification, the lack of a codebook required the current report to preserve the original codes.

Foot self-care practice domain: Foot self-care practice was measured with eight items (PRA1–PRA8). Six items (PRA1–PRA6) were binary (0/1), whereas PRA7 and PRA8 were polytomous (0/1/2), yielding a theoretical observed total score from 3 to 10 in this sample. The total practice score had a mean of 6.86 (SD 1.25) and a median of 7. The database contained a categorical practice variable with three levels: low (score 3), moderate (scores 4–7), and high (scores 8–10). For clinically interpretable regression modeling, a binary outcome was created that contrasted high practice (score 8–10) versus low/moderate practice (score 3–7). The item content should be verified against the original questionnaire before submission; however, the score construction in the file suggests that higher values consistently indicate better preventive behavior.

Quality control and secondary-data management

Before analysis, variable names, score ranges, and category distributions were checked to confirm internal consistency. No impossible values were identified for age, time since diagnosis, total knowledge, total attitudes, or total practice. The dataset was complete for all variables included in the models. Because the source file did not include textual category labels, all summary tables explicitly identify coded categories as such. This approach avoids misclassification while preserving full analytical transparency.

Statistical analysis

Analyses were performed in *Python 3.13* using *pandas*, *NumPy*, *SciPy*, *matplotlib*, and *statsmodels*. Continuous variables were described with means and standard deviations and, when the distributions were skewed or discrete, medians and interquartile ranges. Categorical variables were summarized as counts and percentages. The Shapiro–Wilk test indicated non-normality of the total practice score in both sexes; therefore, the Mann–Whitney U test was used as the primary nonparametric comparison. To facilitate interpretation of the magnitude of the difference, a Welch unequal-variance comparison

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

was additionally reported with 95% confidence intervals and Hedges g as a standardized effect size.

Between-sex differences were examined for age, time since diagnosis, all available sociodemographic variables, total knowledge, total attitudes, total practice, and the categorical practice distribution. Chi-square tests were used for categorical variables, and exact percentages were calculated within each sex. The three-level practice variable was compared across sexes using a chi-square test, and the binary contrast of high practice versus low/moderate practice was evaluated separately because it aligned with the main regression outcome.

Two complementary multivariable models were estimated. First, robust ordinary least-squares regression with HC3 heteroscedasticity-consistent standard errors estimated adjusted mean differences in total practice score. Second, modified Poisson regression with robust standard errors estimated adjusted prevalence ratios (aPRs) for high practice. The primary adjusted models included sex, age (per 10 years), time since diabetes diagnosis (per 5 years), residence, availability of a primary caregiver, foot lesions, study site, total knowledge score, and total attitude score. Reference categories were the database code 1 for most categorical predictors and code 2 for foot lesions, matching the source coding used to derive the fitted models.

Because the source database also contained marital status, educational level, and occupation, a sensitivity analysis was conducted by adding these variables as categorical covariates to the main models. This fully adjusted model allowed assessment of whether the observed sex difference depended on broader socioeconomic composition. In the sensitivity analysis, the point estimate for women remained favorable both for the total score ($\beta = 0.31$, 95% CI -0.06 to 0.69) and for the high-practice outcome (aPR=1.54, 95% CI 1.05 to 2.27), although only the binary high-practice association remained statistically significant.

All statistical tests were two-sided, and p values <0.05 were considered statistically significant. Item-level practice comparisons were treated as exploratory and adjusted using the Holm method to control the family-wise error rate. Results are presented with exact p values, 95% confidence intervals, and effect estimates to emphasize estimation rather than dichotomous interpretation alone.

Ethical considerations

The present analysis used a de-identified dataset. The authors should insert the name of the approving ethics committee, approval number, and the original informed-consent procedure before submission. Data confidentiality was maintained throughout the secondary analysis, and no personally identifiable information was used in the statistical outputs or manuscript tables.

RESULTS

The sample included 228 adults with diabetes, of whom 133 (58.3%) were women and 95 (41.7%) were men. Mean age was 59.82 years (SD 10.40; range 37–85). The median time since diagnosis was 7 years (IQR 4–11), and 10 participants (4.4%) were coded as having foot lesions. The distribution across the three study sites differed by sex ($p=0.015$), as did occupation ($p=0.002$), whereas age, duration of diabetes, marital status, educational level, caregiver availability, and foot-lesion status did not differ significantly between sexes. A trend toward a residence difference was observed ($p=0.067$). Table 1 shows the full descriptive profile using all sociodemographic and clinical variables.

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Table 1.

Sociodemographic and clinical characteristics overall and by sex.

	Overall (N=228)	Men (n=95)	Women (n=133)	p
Age, years, mean $\pm$ SD	59.82 $\pm$ 10.40	59.45 $\pm$ 11.17	60.08 $\pm$ 9.85	0.776
Time since diabetes diagnosis, years, median [IQR]	7 [4–11]	6 [2–11]	7 [4–12]	0.107
Study site (database code)				0.015
Code 1	92 (40.4)	33 (34.7)	59 (44.4)	
Code 2	64 (28.1)	22 (23.2)	42 (31.6)	
Code 3	72 (31.6)	40 (42.1)	32 (24.1)	
Residence (database code)				0.067
Code 1	99 (43.4)	34 (35.8)	65 (48.9)	
Code 2	129 (56.6)	61 (64.2)	68 (51.1)	
Marital status (database code)				0.749
Code 1	15 (6.6)	8 (8.4)	7 (5.3)	
Code 2	172 (75.4)	72 (75.8)	100 (75.2)	
Code 3	21 (9.2)	7 (7.4)	14 (10.5)	
Code 4	16 (7.0)	7 (7.4)	9 (6.8)	
Code 5	4 (1.8)	1 (1.1)	3 (2.3)	
Educational level (database code)				0.405
Code 1	2 (0.9)	1 (1.1)	1 (0.8)	
Code 2	66 (28.9)	24 (25.3)	42 (31.6)	
Code 3	37 (16.2)	11 (11.6)	26 (19.5)	
Code 4	51 (22.4)	25 (26.3)	26 (19.5)	
Code 5	35 (15.4)	17 (17.9)	18 (13.5)	
Code 6	37 (16.2)	17 (17.9)	20 (15.0)	
Occupation (database code)				0.002
Code 1	15 (6.6)	12 (12.6)	3 (2.3)	
Code 2	15 (6.6)	9 (9.5)	6 (4.5)	
Code 3	10 (4.4)	7 (7.4)	3 (2.3)	
Code 4	86 (37.7)	30 (31.6)	56 (42.1)	
Code 5	29 (12.7)	8 (8.4)	21 (15.8)	
Code 6	73 (32.0)	29 (30.5)	44 (33.1)	
Primary caregiver availability (database code)				1.000
Code 1	46 (20.2)	19 (20.0)	27 (20.3)	
Code 2	182 (79.8)	76 (80.0)	106 (79.7)	
Foot lesions (database code)				0.827
Code 1	10 (4.4)	5 (5.3)	5 (3.8)	
Code 2	218 (95.6)	90 (94.7)	128 (96.2)	

Note. Values are n (%) unless otherwise stated.

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Knowledge, attitudes, and foot self-care according to sex

The mean knowledge score was 6.04 (SD 1.91), and the mean attitude score was 4.26 (SD 1.15). Neither score differed significantly by sex, although women showed a slightly higher mean attitude score than men (4.35 vs. 4.14; $p=0.072$). In contrast, women had better foot self-care than men. The mean total practice score was 7.01 (SD 1.22) among women and 6.65 (SD 1.28) among men.

The unadjusted mean difference was 0.35 points (95% CI 0.02 to 0.69; Welch $p=0.036$), and the nonparametric comparison was also significant (Mann–Whitney $p=0.019$). The effect size was small (Hedges $g=0.28$). High practice (score 8–10) was observed in 55 women (41.4%) and 26 men (27.4%; $p=0.042$). The three-category practice distribution showed more women in the high-practice category and more men in the moderate category (Figure 1).

Table 2.

Knowledge, attitudes, and foot self-care outcomes overall and by sex.

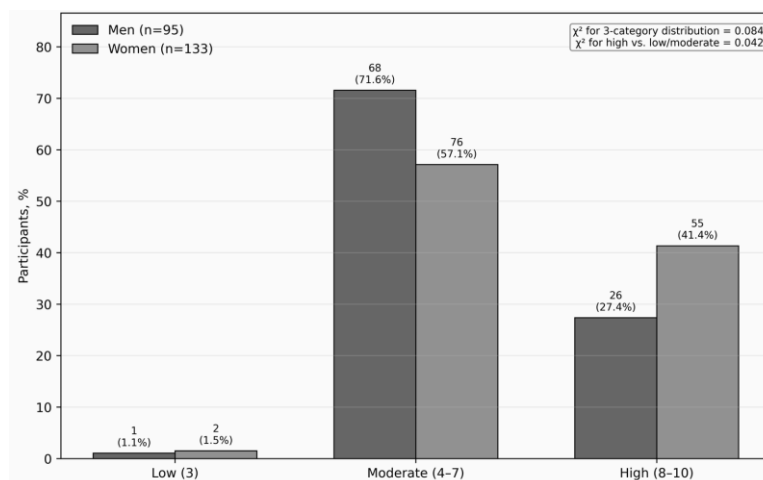
	Overall (N=228)	Men (n=95)	Women (n=133)	p
Knowledge score, mean $\pm$ SD	6.04 $\pm$ 1.91	6.18 $\pm$ 2.07	5.94 $\pm$ 1.80	0.543
Knowledge category (database code)				0.361
Code 1	17 (7.5)	5 (5.3)	12 (9.0)	
Code 2	157 (68.9)	64 (67.4)	93 (69.9)	
Code 3	54 (23.7)	26 (27.4)	28 (21.1)	
Attitude score, mean $\pm$ SD	4.26 $\pm$ 1.15	4.14 $\pm$ 1.22	4.35 $\pm$ 1.10	0.072
Attitude category (database code)				0.544
Code 1	22 (9.6)	11 (11.6)	11 (8.3)	
Code 2	206 (90.4)	84 (88.4)	122 (91.7)	
Practice score, mean $\pm$ SD	6.86 $\pm$ 1.25	6.65 $\pm$ 1.28	7.01 $\pm$ 1.22	0.036
Practice score, median [IQR]	7 [6–8]	7 [6–8]	7 [6–8]	0.019
Practice category (database code)				0.084
Code 1	3 (1.3)	1 (1.1)	2 (1.5)	
Code 2	144 (63.2)	68 (71.6)	76 (57.1)	
Code 3	81 (35.5)	26 (27.4)	55 (41.4)	
High practice (score 8–10), n (%)	81 (35.5)	26 (27.4)	55 (41.4)	0.042

Note. Values are n (%) unless otherwise stated. The categorical knowledge, attitude, and practice variables are reported using the original database coding. Continuous-variable p values are from Mann–Whitney U tests except for the mean practice comparison, for which a Welch test is reported; categorical-variable p values are from chi-square tests.

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Figure 1.

Distribution of foot self-care practice categories by sex



Multivariable analysis of total practice and high practice

In the robust ordinary least-squares model, women had an adjusted total practice score 0.35 points higher than men (95% CI 0.01 to 0.68; $p = 0.041$). Older age showed a positive but nonsignificant association with the total score, while foot lesions showed a negative borderline association. In the modified Poisson model for high practice, women had an adjusted prevalence ratio of 1.56 (95% CI 1.08 to 2.24; $p = 0.018$). Higher knowledge scores were consistently associated with better practice (aPR 1.21, 95% CI 1.08 to 1.35; $p=0.001$), and participants in study site code 2 had a significantly lower prevalence of high practice than those in site code 1 (aPR 0.38, 95% CI 0.18 to 0.80; $p=0.011$). Table 3 and Figure 2 summarize the adjusted estimates.

Table 3.

Multivariable models for total foot self-care score and high foot self-care

Predictor	Adjusted β (95% CI)	p	Adjusted PR (95% CI)	p
Women vs. men	0.35 (0.01 to 0.68)	0.041	1.56 (1.08 to 2.24)	0.018
Age, per 10 years	0.14 (-0.07 to 0.36)	0.195	1.28 (1.03 to 1.60)	0.025
Diabetes duration, per 5 years	0.10 (-0.18 to 0.38)	0.498	0.94 (0.77 to 1.15)	0.552
Residence code 2 vs. 1	-0.29 (-0.70 to 0.12)	0.164	0.87 (0.58 to 1.29)	0.485
Primary caregiver code 2 vs. 1	-0.15 (-0.65 to 0.36)	0.574	0.92 (0.49 to 1.74)	0.802
Foot lesion code 1 vs. 2	-0.88 (-1.84 to 0.07)	0.069	0.53 (0.20 to 1.42)	0.207
Study site code 2 vs. 1	-0.14 (-0.74 to 0.45)	0.637	0.38 (0.18 to 0.80)	0.011
Study site code 3 vs. 1	0.33 (-0.24 to 0.91)	0.253	0.90 (0.56 to 1.45)	0.666
Knowledge total score, per point	0.09 (-0.01 to 0.20)	0.084	1.21 (1.08 to 1.35)	0.001

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Attitude total score, per point	0.13 (-0.05 to 0.30)	0.151	1.11 (0.94 to 1.30)	0.209
---------------------------------	----------------------	--------------	---------------------	--------------

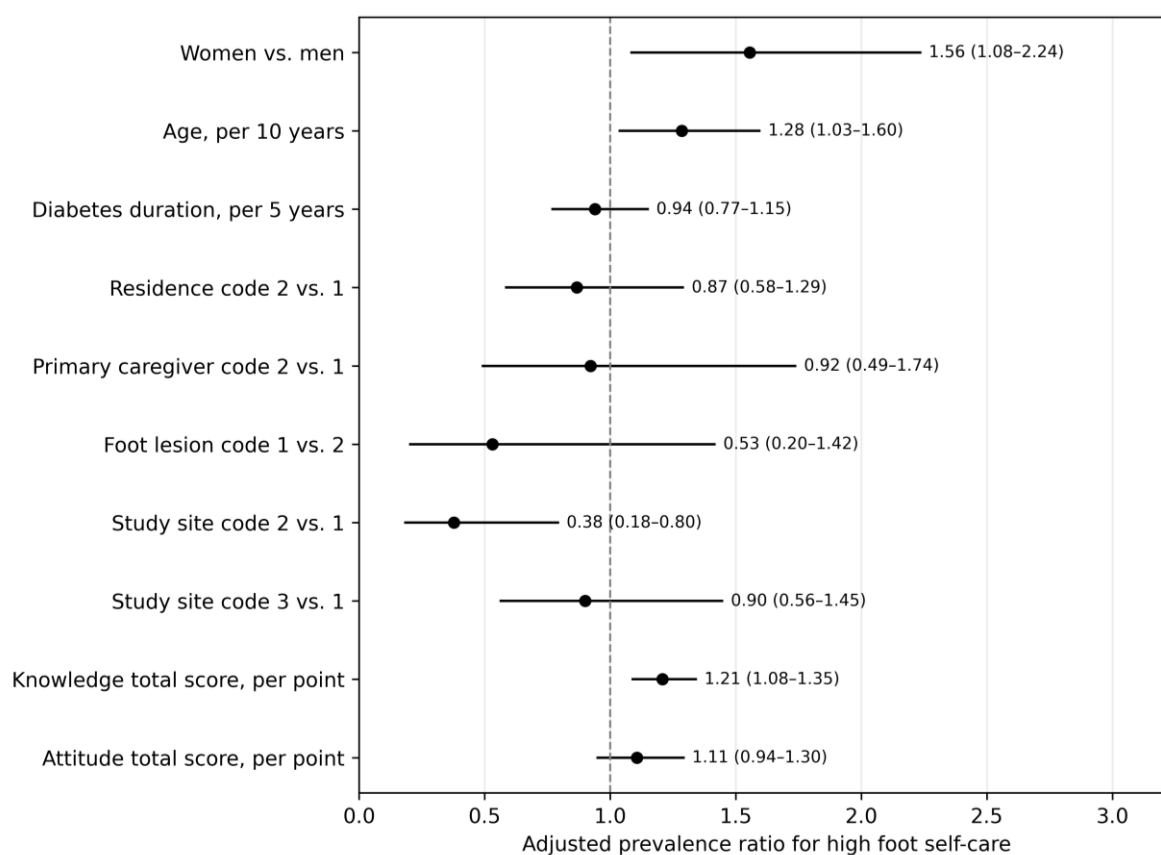
Note. β coefficients come from robust ordinary least-squares regression with HC3 standard errors.

Exploratory item-level analysis

Exploratory item-level comparisons suggested that the main sex difference was concentrated in PRA2, for which women showed higher scores than men (mean 0.68 vs. 0.49; unadjusted $p=0.004$; Holm-adjusted $p=0.032$). The remaining practice items did not show statistically significant differences after multiplicity adjustment. Because the exact item wording was not contained in the source file, these results should be interpreted cautiously and verified against the original questionnaire.

Figure 2.

Adjusted prevalence ratios for high foot self-care (score 8–10).



Note. The model adjusted simultaneously for sex, age, time since diabetes diagnosis, residence, caregiver availability, foot lesions, study site, knowledge score, and attitude score.

DISCUSSION

This study examined sex differences in diabetic foot self-care among adults with diabetes in Cañar, Ecuador, using a complete cross-sectional database with 228 participants and detailed knowledge, attitude, and practice information. Three main findings emerged. First, women reported modestly but significantly better overall foot self-care than men. Second, women were more likely to achieve the high-practice category, and this difference persisted after adjustment for age, disease duration, caregiver availability, foot lesions, study site, knowledge, and attitudes. Third, higher knowledge scores and study-site context were also associated with the prevalence of high practice.

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

The magnitude of the sex difference was small in standardized terms, but the binary high-practice contrast suggests potential clinical relevance. In prevention studies, small differences in routine behaviors can translate into meaningful differences in cumulative exposure to risk, particularly when the behaviors concern daily inspection, footwear, hygiene, or early reporting of lesions. The present findings therefore support the interpretation that women in this sample may engage more consistently in protective foot-care behaviors than men.

The results are consistent with international studies reporting incomplete adherence to diabetic foot self-care recommendations and suggesting that sex-related patterns may influence preventive behaviors (Algethami et al., 2024; Alsalamah et al., 2025; Atalay et al., 2025; Chiwanga & Njelekela, 2015; Jayaweera et al., 2026; Omotosho et al., 2024; Pourkazemi et al., 2020; Taksande et al., 2017; Untari et al., 2024). Reviews have identified recurrent gaps in knowledge and practice across settings (Untari et al., 2024), and recent cross-sectional studies continue to show suboptimal self-care despite long-standing clinical recommendations (Algethami et al., 2024; Alsalamah et al., 2025; Jayaweera et al., 2026; Omotosho et al., 2024; Pourkazemi et al., 2020). The present study adds Andean evidence to this literature by showing that, even in a geographically specific Ecuadorian population, women may be more likely to achieve high foot self-care.

Several pathways could explain the observed difference. Women may be more likely to engage with routine self-monitoring, to follow personal hygiene practices consistently, or to seek help earlier when symptoms arise. Social-role expectations, caregiving experiences, health service use, and communication patterns with health professionals may also contribute. Importantly, the current dataset did not include direct measures of health literacy, income, social support quality, or healthcare access; therefore, the mechanisms behind the sex difference remain inferential rather than directly tested.

The robust association between knowledge and high practice aligns with clinical logic and previous research. Knowledge alone is not sufficient to guarantee behavior change, but it appears to be an enabling factor in this sample. The site-level difference, especially the lower prevalence of high practice at study site code 2, suggests that contextual elements such as organization of diabetes education, service continuity, rural access barriers, or local educational culture may shape patient self-care. These findings reinforce the importance of integrating education with routine clinical follow-up rather than viewing information provision as a standalone intervention.

From a clinical perspective, the findings support sex-responsive foot-care education in primary diabetes services. This does not imply different standards of care for men and women, but it does suggest the value of tailoring educational delivery. Men may benefit from more structured reinforcement, behavior-focused counseling, and direct demonstrations of daily inspection, footwear selection, and early lesion recognition. Meanwhile, the positive association between knowledge and practice supports strengthening educational content in a way that is practical, repetitive, and culturally adapted.

At the health-system level, the site difference observed in the adjusted models suggests that preventive foot-care support should be standardized across facilities or communities in Cañar. Monitoring high-practice prevalence by sex and by site may help identify where coverage is weakest. In line with ADA and IWGDF recommendations, routine risk assessment, repeated education, and referral pathways for emerging lesions should be embedded in diabetes management workflows (American Diabetes Association Professional Practice Committee, 2026; Bus et al., 2024).

This study has several strengths. It analyzed a complete dataset with no missing values for the variables included, used both continuous and clinically interpretable categorical outcomes, reported confidence intervals and effect sizes, and incorporated multivariable models and sensitivity analyses. It also contributes empirical evidence from an underrepresented Andean setting.

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

Several limitations must be acknowledged. First, the cross-sectional design precludes causal inference. Second, practice was self-reported and may be affected by recall or social-desirability bias. Third, the data dictionary was unavailable for some coded variables, which limited the ability to replace numeric categories with descriptive labels in the current manuscript. Fourth, the exact questionnaire wording and psychometric documentation should be recovered before submission. Fifth, the low-practice category was rare, which required binary aggregation for regression. Sixth, only 10 participants had recorded foot lesions, reducing precision for clinical-risk comparisons. Finally, the binary sex coding did not allow evaluation of gender identity or the social mechanisms that may shape preventive behavior.

CONCLUSIONS

Sex Disparities in Foot Self-Care Behavior: Women with type 2 diabetes in Cañar, Ecuador, demonstrated modestly superior foot self-care practices compared to men, showing a significantly higher likelihood of attaining the high-practice category even after adjusting for potential sociodemographic and clinical confounders. These results highlight distinct sex-based behavioral patterns and sociocultural dynamics in the daily adherence to preventive foot care routines.

Role of Diabetes Knowledge and Local Health-Service Context: Diabetes-related knowledge and the specific healthcare facility context were identified as essential determinants for effective preventive behaviors. Higher literacy regarding diabetic foot complications was positively associated with systematic self-inspection, proper footwear selection, and daily foot hygiene, emphasizing that local educational strategies within primary healthcare services substantially reinforce patient adherence.

Implications for Sex-Responsive Health Policies: These findings provide strong empirical support for implementing sex-responsive, behavior-focused, and culturally adapted foot-care education programs within Ecuadorian diabetes management services. Interventions must specifically target men—who exhibit lower engagement in routine preventive practices—to mitigate the risk of ulceration and lower-extremity amputations.

Future Research Directions: Future longitudinal and mixed-methods research is needed to elucidate the complex pathways linking sex differences, sociocultural factors, healthcare delivery models, and sustained preventive behaviors among Ecuadorian adults living with diabetes across diverse regional contexts

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest in relation to the present research.

AUTHOR CONTRIBUTION

The contribution of authors must be declared when the article is by more than one author; It must briefly state the contributions of each author

Author and Co-authors	Contributions
Gloria Alexandra Latacela Lligui	Data Collection, Conceptualization, Data Analysis, Manuscript Review, Funding, Final Version Review
Vanessa de Los Ángeles Belloso de Noriega	Research Supervision, Final Version Review, Spelling and Data Analysis.

BIBLIOGRAPHIC REFERENCES

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

- American Diabetes Association Professional Practice Committee. (2026). Retinopathy, neuropathy, and foot care: Standards of Care in Diabetes—2026. *Diabetes Care*, 49(Suppl. 1), S261–S276. <https://doi.org/10.2337/dc26-S012>
- Algethami, A., Mustafa, M., Lockhart, M., Reilly, L., McKearney, E., Fortune, K., Siddique, N., Kyaw-Tun, T., Sreenan, S., & McDermott, J. H. (2024). Knowledge and practice of foot self-care behaviours in Irish diabetes patients with high-risk feet. *Irish Journal of Medical Science*, 193(6), 2791–2796. <https://doi.org/10.1007/s11845-024-03807-1>
- Alsalamah, R., Alshaiban, S., Alsagri, R. A., Alnowaisser, L., Alharbi, A., & Alharbi, S. (2025). Knowledge, attitude, and practices regarding diabetic foot care in Al-Qassim, Saudi Arabia: A cross-sectional study. *Cureus*, 17, e81475. <https://doi.org/10.7759/cureus.81475>
- Armstrong, D. G., Tan, T. W., Boulton, A. J. M., & Bus, S. A. (2023). Diabetic foot ulcers: A review. *JAMA*, 330(1), 62–75. <https://doi.org/10.1001/jama.2023.10578>
- Atalay, Y. A., Alemie, B. W., & Gelaw, K. A. (2025). Prevalence and associated factors of foot self-care practice among diabetic patients in Africa: Systematic review and meta-analysis. *Frontiers in Endocrinology*, 16, 1527402. <https://doi.org/10.3389/fendo.2025.1527402>
- Baldeón, M. E., Felix, C., Fornasini, M., Zertuche, F., Largo, C., Paucar, M. J., Ponce, L., Rangarajan, S., Yusuf, S., & López-Jaramillo, P. (2021). Prevalence of metabolic syndrome and diabetes mellitus type-2 and their association with intake of dairy and legume in Andean communities of Ecuador. *PLOS ONE*, 16(7), e0254812. <https://doi.org/10.1371/journal.pone.0254812>
- Bus, S. A., Sacco, I. C. N., Monteiro-Soares, M., Raspovic, A., Paton, J., Rasmussen, A., Lavery, L. A., & van Netten, J. J. (2024). Guidelines on the prevention of foot ulcers in persons with diabetes (IWGDF 2023 update). *Diabetes/Metabolism Research and Reviews*, 40(3), e3651. <https://doi.org/10.1002/dmrr.3651>
- Chiwanga, F. S., & Njelekela, M. A. (2015). Diabetic foot: Prevalence, knowledge, and foot self-care practices among diabetic patients in Dar es Salaam, Tanzania: A cross-sectional study. *Journal of Foot and Ankle Research*, 8, 20. <https://doi.org/10.1186/s13047-015-0080-y>
- Cortéz-Luengo, V. & Ocampo-Eyzaguirre, D. (2025). Inteligencia emocional en equipos directivos: estrategias para su evaluación y regulación.: Caso Valparaíso. Chile. *Revista RETOS XXI*, 9(1). <https://doi.org/10.30827/retosxxi.9.2025.32905>
- Del Brutto, O. H., Mera, R. M., King, N. R., Zambrano, M., & Sullivan, L. J. (2016). The burden of diabetes-related foot disorders in community-dwellers living in rural Ecuador: Results of the Atahualpa Project. *Foot*, 28, 26–29. <https://doi.org/10.1016/j.foot.2016.05.003>
- Dorresteijn, J. A. N., Kriegsman, D. M. W., Assendelft, W. J. J., & Valk, G. D. (2014). Patient education for preventing diabetic foot ulceration. *Cochrane Database of Systematic Reviews*, 2014(12), CD001488. <https://doi.org/10.1002/14651858.CD001488.pub5>
- Elmansy, F. M., & Elbqry, M. G. (2024). Self-care knowledge, attitude, and practice among diabetic foot patients: A cross-sectional research. *Zagazig Nursing Journal*, 20, 168–183. <https://doi.org/10.21608/znj.2024.343681>

Sex Differences in Foot Self-Care Among Adults with Diabetes in Cañar, Ecuador.

International Diabetes Federation. (2025). *IDF diabetes atlas* (11th ed.).

Jayaweerage, B. N., Hettiarachchi, M., Kaveesha, A. D., Gamaralalage, M. R., Sisudan, S., Mahanama, P., Malawi Arachchi, C. D., Kamshiga, T., Kaushalya, S., Shopijen, E., & Kisokanth, G. (2026). Foot self-care knowledge, practices and associated factors among individuals diagnosed with diabetes attending clinics at base hospitals in Colombo, Sri Lanka: An analytical cross-sectional study. *BMJ Open*, 16(4), e108460. <https://doi.org/10.1136/bmjopen-2025-108460>

Jeffcoate, W. J., Bus, S. A., Game, F. L., Hinchliffe, R. J., Price, P. E., & Schaper, N. C. (2018). Current challenges and opportunities in the prevention and management of diabetic foot ulcers. *Diabetes Care*, 41(4), 645–652. <https://doi.org/10.2337/dc17-1836>

Jia, H., Wang, X., & Cheng, J. (2022). Knowledge, attitudes, and practices associated with diabetic foot prevention among rural adults with diabetes in North China. *Frontiers in Public Health*, 10, 876105. <https://doi.org/10.3389/fpubh.2022.876105>

Ocampo-Eyzaguirre, D., & Carreón-Muñoz, E. (2025). Humanismos emergentes: reconfiguración de los valores humanos en la era de la inteligencia artificial. Caso de América Latina. *Portal de la Ciencia*, 6(1), 138-153. <https://doi.org/10.51247/pdlc.v6i1.514>

Omotosho, T. O. A., Sanyang, Y., & Senghore, T. (2024). Diabetic foot self-care knowledge and practice among patients with diabetes attending diabetic clinic in The Gambia. *International Wound Journal*, 21, e14963. <https://doi.org/10.1111/iwj.14963>

Pacheco-Salazar, B. Ocampo-Eyzaguirre, D. (2026) ¿Cuidar es Cuestión de Género? Prácticas de Liderazgo del Cuidado en Directores y Directoras en República Dominicana. *Ibero Ciencias-Revista Científica y Académica-ISSN 3072-7197*, 2026, vol. 5, no 3, p. 940-958. <https://doi.org/10.63371/ic.v5.n3.a1457>

Pourkazemi, A., Ghanbari, A., Khojamli, M., Balo, H., Hemmati, H., Jafaryparvar, Z., & Motamed, B. (2020). Diabetic foot care: Knowledge and practice. *BMC Endocrine Disorders*, 20, 40. <https://doi.org/10.1186/s12902-020-0512-y>

Puig-García, M., Caicedo-Montaño, C., Márquez-Figueroa, M., Chilet-Rosell, E., Montalvo-Villacis, G., Benazizi-Dahbi, I., Peralta, A., Torres-Castillo, A. L., & Parker, L. A. (2023). Prevalence and gender disparities of type 2 diabetes mellitus and obesity in Esmeraldas, Ecuador: A population-based survey in a hard-to-reach setting. *International Journal for Equity in Health*, 22, 124. <https://doi.org/10.1186/s12939-023-01939-x>

Taksande, B. A., Thote, M., & Jajoo, U. N. (2017). Knowledge, attitude, and practice of foot care in patients with diabetes at central rural India. *Journal of Family Medicine and Primary Care*, 6(2), 284–287. <https://doi.org/10.4103/2249-4863.219994>

Untari, E. K., Andayani, T. M., Yasin, N. M., & Asdie, R. H. (2024). A review of patient knowledge and practice of diabetic foot self-care. *Malaysian Journal of Medical Sciences*, 31(1), 33–50. <https://doi.org/10.21315/mjms2024.31.1.3>