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No funding was received for this study. The authors declare no conflict of interest. The study received ethical approval. All participants provided informed consent.

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Prevalence of Plantar Fasciitis Among Street Vendors of Bahawalpur

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ABSTRACT

Background: *Plantar fasciitis (PF) is a degenerative fasciopathy and a leading cause of heel pain; informal workers who stand for prolonged periods on hard surfaces may be at elevated risk.* ***Objective***: *To estimate the point prevalence of PF among male street vendors in Bahawalpur, Pakistan; to characterize pain and functional impact; and to examine associations between body mass index (BMI) and disability.* ***Methods***: *We conducted a three-month cross-sectional study using convenience sampling of male vendors aged 20–45 years. PF was ascertained with a weight-bearing Windlass test. Severity/impact were assessed using the Foot Function Index (FFI) and the Plantar Fasciitis Pain and Disability Scale (PFPDS); pain intensity used a 0–10 VAS. BMI was categorized per WHO bands. Analyses included point prevalence with 95% Wilson confidence intervals (CIs), descriptive statistics, and Pearson* χ^2 *with Cramér's V for BMI–disability associations (SPSS v27).* ***Results***: *Of 350 participants (mean age 32.66±6.85 years; BMI 23.63±2.99 kg/m²), 47 screened positive, yielding a PF prevalence of 13.4% (95% CI 10.3–17.4). Whole-sample means were FFI 20.46 (95% CI 19.19–21.73) and PFPDS 13.01 (95% CI 11.48–14.54); most fell in the lowest disability bands (FFI 1–20: 69.7%; PFPDS 1–20: 88.0%). Pain was minimal for most when using footwear/orthotics. Higher BMI categories were associated with higher disability strata: FFI* $\chi^2(16)=30.03$, $p=0.018$, *Cramér's* $V=0.146$; *PFPDS* $\chi^2(12)=37.57$, $p<0.001$, $V=0.189$. ***Conclusion***: *Approximately one in seven male street vendors had PF, with generally low average disability but a measurable BMI–disability gradient. Low-cost ergonomic measures (supportive footwear/orthoses, load management, weight counseling) are warranted; prevalence may be underestimated given Windlass sensitivity.*

Keywords
Plantar Fasciitis; Occupational Health; Body Mass Index; Foot Orthoses

INTRODUCTION

Plantar fasciitis (PF) is a degenerative fasciopathy of the plantar fascia and a leading cause of heel pain in adults, with symptoms that typically worsen with the first steps after rest and after prolonged weight-bearing (2–4). Although historically framed as an inflammatory disorder, contemporary evidence supports a primary degenerative process with possible secondary inflammation, aligning clinical management toward load modification, footwear/orthoses, and targeted rehabilitation (2–4). Occupational exposure to prolonged standing/walking on hard surfaces, repetitive loading, and suboptimal footwear is a well-described risk context for PF and related heel pain syndromes (5–7).

Street vendors constitute a large informal workforce that commonly operates on uneven or hard pavements for extended hours, often with limited ergonomic support and restricted access to healthcare, plausibly increasing PF risk. In Pakistan, occupational studies report substantial foot pain or PF burden among teachers, nurses, security guards, and sales personnel, underscoring the role of prolonged standing, footwear, and body mass index (BMI) (8–11). However, evidence specific to street vendors is scarce, despite similar or greater exposure to biomechanical stressors. Diagnostic ascertainment in field settings commonly relies on clinical tests such as the Windlass test, which reproduces heel pain with first-metatarsophalangeal dorsiflexion and is widely cited in clinical pathways for PF (12,13).

From an epidemiological standpoint, prevalence denotes the proportion of individuals in a defined population who have a condition at a specified point (point prevalence) or period (period prevalence) in time (1). Robust prevalence estimates in high-exposure occupations are essential for planning ergonomic interventions, screening strategies, and counseling on modifiable risks such as BMI and footwear.

Objective. We aimed to estimate the point prevalence of PF among male street vendors in Bahawalpur, Pakistan, using the Windlass test for case ascertainment; to describe the pain/disability profile using validated foot-specific instruments; and to explore the association between BMI and disability strata to inform prevention and workplace health strategies.

MATERIALS AND METHODS

We conducted a descriptive cross-sectional study in Bahawalpur, Pakistan, over three months. The setting comprised common street-vending locations (markets and pavements with hard surfaces), reflecting routine occupational exposure to prolonged standing and walking.

Male street vendors aged 20–45 years were eligible. Exclusions were: neurological disorders affecting motor/sensory function (e.g., stroke, Guillain–Barré), chronic musculoskeletal disease substantially affecting locomotion (e.g., OA, RA), major psychiatric illness, and recent surgery—especially of the lower limb. Written informed consent was obtained from all participants.

Sampling used convenience, non-probability procedures at vending sites. A total of 350 vendors were enrolled (no missing data were recorded for primary or secondary variables).

Primary outcome (point prevalence): clinical plantar fasciitis (PF) ascertained with the Windlass test performed in weight-bearing: passive dorsiflexion of the hallux at the first metatarsophalangeal joint reproducing typical heel pain was considered positive (12,13). The Windlass test is commonly used in clinical pathways; it has high specificity and modest sensitivity, implying potential under-ascertainment in field screening (12,13).

Secondary outcome measures were Foot Function Index (FFI) total score (higher = worse function/pain/disability). We followed standard item summation and total-score computation (15). Plantar Fasciitis Pain and Disability Scale (PFPDS) total score (higher = worse pain/disability) using the established questionnaire and scoring approach (16). Pain intensity: Visual Analogue Scale (VAS) recorded on a 0–10 scale (anchors: 0 = no pain; 10 = worst imaginable pain) (14). If any responses had been captured on 0–100, they would be converted to 0–10 by dividing by 10; no alternative scaling (e.g., ÷8.3) was used or is recommended (14). BMI (kg/m²): categorized as Underweight (<18.5), Normal (18.5–24.99), Overweight (25.0–29.99), Class I Obesity (30.0–34.99), and Class III Obesity (≥40) to mirror reporting in the Results tables. Occupation: vendor category (fruit, fast food, vegetables, ice cream, clothes, meat, shoes).

All questionnaires were administered face-to-face by trained assessors. Instrument directionality (higher scores = worse) was explained to participants before completion.

With n=350, the study was powered to estimate a single proportion (prevalence) with ~±3.5–4.0% absolute 95% CI half-width for an expected prevalence around 10–15%, which is appropriate for occupational screening studies (1). The primary estimate was point prevalence of Windlass-positive PF with 95% confidence intervals (CIs) (Wilson method) (1). Continuous variables (age, BMI, FFI, PFPDS) are reported as mean ± SD with 95% CIs. Categorical variables are reported as n (%).

For associations between BMI categories and disability strata (FFI bands; PFPDS bands), we used Pearson's χ^2 with Cramér's V as effect size (small ≈ 0.10, moderate ≈ 0.30). All tests were two-sided with $\alpha = 0.05$. Analyses were conducted in SPSS v27.

The study adhered to the principles of the Declaration of Helsinki. Ethical approval was obtained from the departmental Ethics Review Committee prior to recruitment; all participants provided written informed consent.

RESULTS

The study enrolled 350 male street vendors with a mean age of 32.66±6.85 years (95% CI 31.94–33.38) and a mean BMI of 23.63±2.99 kg/m² (95% CI 23.31–23.94). Most participants were of normal weight (72.0%) or overweight (24.3%); obesity was uncommon (Class I 2.3%, Class III 0.3%). The primary vendor groups were fruit sellers (29.7%), fast-food sellers (25.1%), and vegetable sellers (20.9%) (Table 1). Using a weight-bearing Windlass test, 47/350 screened positive, yielding a point prevalence of plantar fasciitis of 13.4% (95% CI 10.3–17.4); 86.6% screened negative (Table 2). On whole-sample severity metrics, average impairment was low: FFI mean 20.46±12.12 (95% CI 19.19–21.73) and PFPDS mean 13.01±14.61 (95% CI 11.48–14.54) (Table 3).

Consistent with this, the majority clustered in the lowest disability bands (FFI 1–20: 69.7%; PFPDS 1–20: 88.0%), with only 5.7% and 7.4% exceeding 40 on FFI and PFPDS, respectively (Table 4). Pain intensity was none-to-mild for most respondents: on the 0–10 VAS, 20.8% reported 0, 51.4% reported 1–3, 16.6% 4–6, and 11.1% 7–10. "Worst foot pain" was predominantly mild (levels 1–2 in 64.5%), and 79.1% reported level-1 morning pain. Over the previous six weeks, pain typically occurred every other week (85.7%), less often weekly (10.6%) or daily (3.7%).

Table 1. Participant characteristics (N = 350)

Variable	n / Mean	% / SD	95% CI
Age, years	32.66	6.85	31.94 to 33.38
BMI, kg/m²	23.63	2.99	23.31 to 23.94
BMI category			
Underweight (<18.5)	4	1.1	—
Normal (18.5–24.99)	252	72.0	—
Overweight (25.0–29.99)	85	24.3	—
Class I obesity (30.0–34.99)	8	2.3	—
Class III obesity (≥40)	1	0.3	—
Profession			
Fruit seller	104	29.7	—
Fast-food seller	88	25.1	—
Vegetable seller	73	20.9	—
Ice-cream seller	44	12.6	—
Clothes seller	15	4.3	—
Meat seller	14	4.0	—
Shoes seller	12	3.4	—

Table 2. Point prevalence of plantar fasciitis by Windlass test (primary outcome)

Outcome	n / N	%	95% CI	Notes
Windlass positive	47 / 350	13.4	10.3 to 17.4	Wilson CI
Windlass negative	303 / 350	86.6	—	—

The time of worst pain was stable for 84.0%, with smaller fractions reporting afternoon-only (10.3%), day-and-night (2.0%), or first-getting-up (3.7%) patterns (Table 5). Functionally, pain never interfered with weight-bearing in 78.3%. After waking, 89.7% needed no time to walk comfortably, and only 4.0% required ≥11 minutes.

Pain seldom confined participants indoors (88.4% "not at all") or to bed (89.1% "not at all"). Footwear and orthotics were strongly associated with minimal pain: level-1 pain while walking occurred in 72.0% with shoes and 88.6% with orthotics; while standing, 78.6% with shoes and 88.3% with orthotics reported level-1 pain (Table 8). Pain was described as surface by 88.0% and deep by 12.0%; the most frequent sites were the toes

(43.4%) and bottom of heel (30.0%), followed by the ball of the foot (15.4%) and mid-sole (11.1%) (Table 9). Importantly, BMI category was associated with higher disability strata on both instruments: for FFI, χ^2=30.03, df=16, p=0.018, Cramér's V=0.146, with a significant linear trend (p=0.001) (Table 6); for PFPDS, χ^2=37.57, df=12, p<0.001, V=0.189, with a significant trend (p<0.001) (Table 7). Although effect sizes were small to small–moderate, these associations indicate a graded BMI–disability relationship consistent across measures.

Table 3. Whole-sample continuous outcomes (severity/impact)

Measure	Mean	SD	95% CI (mean)
FFI total score	20.46	12.12	19.19 to 21.73
PFPDS total score	13.01	14.61	11.48 to 14.54

Table 4. Disability band distributions

Scale / Band	n	%
FFI total		
1–20	244	69.7
21–40	85	24.3
41–60	13	3.7
61–80	7	2.0
81–100	1	0.3
PFPDS total		
1–20	308	88.0
21–40	16	4.6
41–60	21	6.0
61–80	5	1.4

Table 5. Pain severity and pattern (VAS 0–10; frequency/time-of-day)

Variable	Category	n	%
VAS (0–10)	0	73	20.8
	1–3 (mild)	180	51.4
	4–6 (moderate)	58	16.6
	7–10 (severe)	39	11.1
Worst foot pain	Level 1–2	226	64.5
	Level 3–4	86	24.6
	Level 5–10	38	10.9
Morning pain	Level 1	277	79.1
	Level ≥2	73	20.9
Pain frequency (past 6 weeks)	Every other week	300	85.7
	Once a week	37	10.6
	Daily (once/many times)	13	3.7
Time of worst pain (past 6 weeks)	Always the same	294	84.0
	Afternoon only	36	10.3
	Day & night	7	2.0
	On first getting up	13	3.7

Table 6. BMI category × FFI disability band (N = 350)

BMI → / FFI ↓	1–20	21–40	41–60	61–80	81–100	Row total
Underweight	4	0	0	0	0	4
Normal	185	56	5	5	1	252
Overweight	54	23	6	2	0	85
Class I obesity	1	5	2	0	0	8
Class III obesity	0	1	0	0	0	1
Column total	244	85	13	7	1	350

Test	Statistic	df	p-value	Effect size	Trend test (p)
Pearson χ^2	30.03	16	0.018	Cramér's V = 0.146	0.001

Table 7. BMI category × PFPDS disability band (N = 350)

BMI → / PFPDS ↓	1–20	21–40	41–60	61–80	Row total
Underweight	4	0	0	0	4
Normal	233	6	9	4	252
Overweight	67	8	9	1	85
Class I obesity	3	2	3	0	8
Class III obesity	1	0	0	0	1
Column total	308	16	21	5	350

Test	Statistic	df	p-value	Effect size	Trend test (p)
Pearson χ^2	37.57	12	<0.001	Cramér's V = 0.189	<0.001

Table 8. Functional interference and mitigating factors (selected items)

Item (response)	n	%
Interference with weight-bearing: Never	274	78.3
Occasionally / Frequently / Always	76	21.7
Time after waking to walk comfortably: No time	314	89.7
≥ 11 minutes	14	4.0
Stayed inside all day due to feet: Not at all	313	88.4
≥ Very little	41	11.6
Stayed in bed due to feet: Not at all	312	89.1
≥ Very little	38	10.9
Walking with shoes: Pain level 1	252	72.0
Standing with shoes: Pain level 1	275	78.6
Walking with orthotics: Pain level 1	310	88.6
Standing with orthotics: Pain level 1	309	88.3

Table 9. Pain location and character

Variable	Category	n	%
Pain depth	Surface	308	88.0
	Deep	42	12.0
Pain location	Toes	152	43.4
	Bottom of heel	105	30.0
	Ball of foot	54	15.4
	Mid-sole	39	11.1

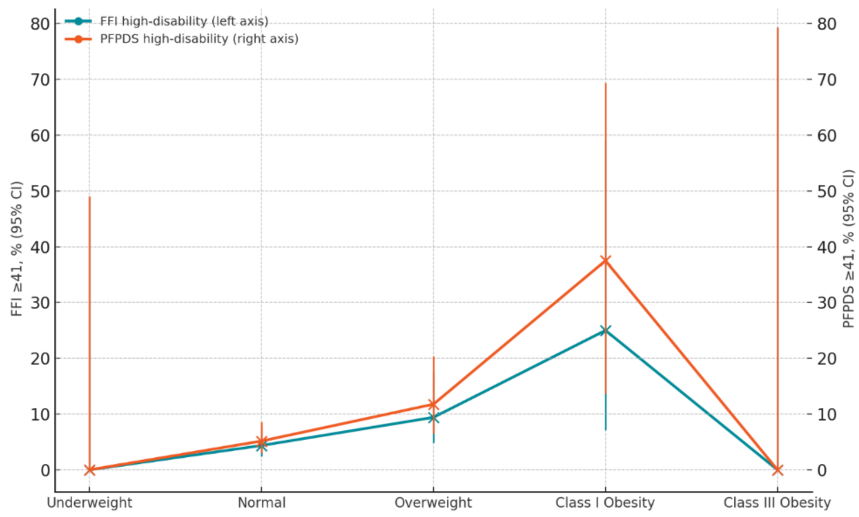

Figure 1 High-Disability Burden Across BMI Categories: FFI and PFPDS Thresholds (≥41)

Across five BMI strata (Underweight n=4, Normal n=252, Overweight n=85, Class I Obesity n=8, Class III Obesity n=1), the proportion with FFI ≥41 rose from 4.4% in Normal (11/252; 95% CI 2.5–7.7) to 9.4% in Overweight (8/85; 4.9–17.2) and 25.0% in Class I Obesity (2/8; 7.2–59.1), with 0% in Underweight (0/4; 0.0–49.0) and Class III (0/1; 0.0–79.3). For PFPDS ≥41, corresponding proportions increased from 5.2% in Normal (13/252; 3.1–8.8) to 11.8% in Overweight (10/85; 6.5–20.4) and 37.5% in Class I Obesity (3/8; 13.7–69.4), with 0% in Underweight (0/4; 0.0–49.0) and Class III (0/1; 0.0–79.3). The paired series demonstrate a concordant BMI–disability gradient on both instruments, with visibly wider intervals in sparse strata (n≤8). These aggregated, threshold-based burdens complement prevalence estimates by emphasizing clinically consequential impairment (scores ≥41), highlighting a step-up from Normal to Overweight and a further rise in Class I Obesity on both FFI (left axis) and PFPDS (right axis).

DISCUSSION

Among 350 male street vendors in Bahawalpur, the point prevalence of clinically ascertained plantar fasciitis (PF) was 13.4% (95% CI 10.3–17.4) based on a weight-bearing Windlass test (Table 2). Overall disability was low at the population level (FFI mean 20.46; PFPDS mean 13.01; Table 3), with most respondents in the lowest disability bands (Table 4). BMI category showed statistically significant associations with higher FFI and PFPDS strata with small–to–moderate effect sizes (Cramér's V 0.146 and 0.189, respectively; Tables 6–7). Pain patterns—worse with first steps and after accumulated loading—were consistent with PF pathomechanics, and footwear/orthotics corresponded to minimal pain levels for most participants (Tables 5 and 8).

The observed prevalence sits below several occupation-specific reports in high–standing jobs (e.g., teachers and beauticians) and below some clinic-based estimates from symptomatic samples (6–11). Two explanations are likely. First, our community, workplace-based sampling includes many minimally symptomatic individuals, unlike studies recruiting from care-seeking populations (6,7,11). Second, our case definition relied on the Windlass test, which—while highly specific—has modest sensitivity, so under-ascertainment of PF is plausible (12,13). Together, these factors would shift prevalence downward relative to symptomatic or multi-criterion designs.

The BMI–disability gradient aligns with mechanical overload theory and occupational loading data from industrial and service settings (2–5). Although effect sizes were small, the consistent trend across both instruments suggests that weight management could modestly reduce symptom burden at the group level, especially alongside supportive footwear/orthoses—interventions already central to conservative PF care (3). The very high proportion reporting minimal pain with shoes or orthotics supports low-cost ergonomic measures (e.g., cushioned insoles, heel cups) as feasible first-line strategies in informal work settings (3,5).

Strengths include: (i) field-based ascertainment in an under-studied informal workforce; (ii) a clear primary endpoint with precision estimates; and (iii) use of validated foot-specific scales for severity/impact (15,16). Key limitations temper inference: (i) single-city, male-only, non-probability sampling limits generalizability; (ii) reliance on a single clinical test (Windlass) risks missed cases (12,13); (iii) absence of multivariable adjustment (e.g., for age, vending category, hours standing) means BMI associations may be partly confounded; and (iv) cross-sectional design precludes causal claims. Instrument language/administration was standardized, but formal local validation and measurement invariance were not evaluated (15,16).

Given a one-in-seven burden with generally low average disability, scalable measures are pragmatic: routine footwear/orthoses provision, brief stretching/education on first-step pain, and weight-management counseling embedded in community outreach (3,5). Municipal or NGO programs supporting vendors could incorporate periodic screening using a multi-criterion algorithm (Windlass plus symptom pattern and palpation tenderness) to improve sensitivity (12,13). Even small reductions in pain/disability may yield disproportionate gains in productivity and income in this population.

Priority directions include: (i) probability sampling across multiple cities (including women) to enhance external validity; (ii) multivariable models (logistic for Windlass positivity; ordinal/linear for disability) adjusting for age, BMI (continuous), hours standing/walking, surface hardness, and footwear; (iii) alternative/combined diagnostic criteria (e.g., Windlass + provocation palpation ± ultrasound in subsets) to address sensitivity (12,13); and (iv) prospective cohorts to characterize natural history and response to low-cost ergonomic interventions. Local validation of FFI/PFPDS translations and minimal clinically important differences would strengthen outcome interpretation (15,16).

CONCLUSION

In a community, workplace-based sample of 350 male street vendors in Bahawalpur, the point prevalence of plantar fasciitis (PF)—ascertained by a weight-bearing Windlass test—was 13.4% (95% CI 10.3–17.4). On average, pain and disability were low (whole-sample FFI and PFPDS means 20.46 and 13.01, respectively), yet higher BMI categories aligned with higher disability strata on both instruments, with small to small–moderate effects. Pain patterns (worse with first steps and after cumulative loading) and the marked reduction of symptoms with footwear/orthotics are consistent with the mechanical load profile of this occupation. These findings support pragmatic, low-cost measures—ready access to cushioned footwear/insoles or heel cups, brief education on load management and first-step pain, and weight-management counseling—as feasible first-line strategies for informal workers. At a programmatic level, periodic screening in vendor hubs using a multi-criterion clinical algorithm (Windlass plus typical symptom pattern and point tenderness) could improve case detection and guide early conservative care. Generalizability is constrained by the single-city, male-only, convenience sample and reliance on a single clinical test with modest sensitivity, which likely underestimates true prevalence. Future studies should employ probability sampling across multiple cities (including women), incorporate multivariable models adjusting for occupational exposures, and evaluate combined diagnostic criteria or imaging subsamples to refine estimates. Even modest reductions in foot pain and disability may yield meaningful productivity and quality-of-life gains in this underserved workforce; the present data provide a concrete foundation for targeted ergonomic and public-health interventions.

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