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Original article

Inhaler Misconceptions Among Adult Asthma Patients in Sebha, Libya: A Cross-Sectional Study

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Keywords
Asthma, Inhaler Adherence, Patient Misconceptions, Health Beliefs, Libya, Cross-sectional Study.

ABSTRACT

Asthma is a chronic inflammatory airway disease responsible for substantial global morbidity, and inhaled pharmacotherapy remains the cornerstone of its management. Despite the proven efficacy of inhaler therapy, adherence remains suboptimal, with patient-held misconceptions a major modifiable barrier. A cross-sectional study was conducted from May 2025 to March 2026 at Sebha Medical Centre and the affiliated outpatient respiratory clinic in Sebha, Libya. Forty-eight adults with a confirmed diagnosis of mild-to-moderate bronchial asthma who were currently prescribed an inhaler were recruited by convenience sampling. A structured, four-section questionnaire assessed demographics, asthma disease history, inhaler use patterns, and beliefs about inhaler therapy (eight items rated on a three-point Likert scale). Descriptive statistics were computed in Minitab 21.1; inferential analyses—Chi-square tests of independence, Mann–Whitney U tests, and Spearman rank correlations—were performed in R 4.2.1 at $\alpha = 0.05$. The mean participant age was 42.0 years (SD = 15.9); 64.6% were female. The most prevalent misconception was that inhalers should be reserved for emergencies, endorsed by 66.7% of respondents. Side-effect avoidance was reported by 54.2%, and 33.3% believed inhalers to be addictive. Although only 14.6% explicitly agreed that inhalers cause cardiac or pulmonary damage, 43.8% remained uncertain. Despite these misconceptions, 64.6% acknowledged that regular inhaler use helps control asthma, and 83.3% expressed a desire for additional education. Chi-square analyses revealed no statistically significant association between any assessed belief or demographic variable and current inhaler use (all $p > 0.05$). Spearman correlation analysis identified one significant finding: public embarrassment about using an inhaler in public was positively correlated with the presence of chronic cough ($r = 0.290$, $p = 0.046$). Misconceptions regarding inhaler therapy are highly prevalent among asthma patients in Sebha, even among those with higher educational attainment. The significant association between social embarrassment and chronic cough underscores the clinical relevance of psychosocial barriers to adherence. The near-universal desire for further education provides a compelling mandate for structured, culturally adapted patient education programs.

Introduction

Asthma is among the most common non-communicable diseases worldwide, affecting an estimated 262 million individuals and contributing to approximately 500,000 hospitalizations and 250,000 deaths annually [1,2]. Characterized by chronic airway inflammation, bronchial hyperresponsiveness, and variable reversible airflow obstruction, asthma significantly impairs quality of life and generates substantial economic costs for patients and healthcare systems alike [3,4]. Globally, between 5% and 10% of individuals across all age groups are affected, and poorly controlled disease is associated with avoidable hospitalizations, lost work productivity, and considerable psychosocial burden [5,6].

Inhaled pharmacotherapy is the cornerstone of asthma management. Both controller therapies principally inhaled corticosteroids (ICS) and long-acting beta-2 agonists (LABA), and short-acting reliever agents are administered via inhalation to maximize airway drug deposition while minimizing systemic exposure.[7] However, the clinical effectiveness of these agents is directly contingent upon correct inhaler technique and consistent adherence to the prescribed regimen. Suboptimal use, whether resulting from poor technique, intermittent administration, or complete non-adherence, leads to uncontrolled symptoms, increased reliever use, preventable emergency presentations, and higher healthcare costs [8,9]. Even the most efficacious inhaled medication confers minimal benefit if it is not acceptable to or correctly used by the patient [10].

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Adherence to inhaled controller therapies is estimated to range from 30% to 70% across diverse clinical populations, indicating that the problem of non-adherence is both widespread and persistent [11,13].
A prominent and modifiable driver of poor adherence is patient-held misconceptions about inhaler therapy. Negative beliefs, including fears of addiction, concerns about cardiac or pulmonary damage, and the erroneous view that inhalers are appropriate only during acute exacerbations, are widely documented across different countries and healthcare settings [5,14,15]. These beliefs represent potent attitudinal barriers to medication adherence and appropriate self-management. Social and psychosocial factors, including embarrassment about using an inhaler in public and stigma associated with visible medication use, compound these barriers, and may further drive avoidance behaviors that compromise asthma control [15,16]. Studies conducted in South Asia, North America, and Europe have consistently demonstrated that misconceptions are prevalent even among educated patients and across diverse sociodemographic strata [3,11,16–18].
Despite growing international evidence on inhaler-related misconceptions, data from North Africa and the Arab world remain limited. Libya, a lower-middle-income country with a healthcare system that is still recovering from years of political disruption, faces specific challenges in chronic respiratory disease management, including restricted access to specialist care and a relative absence of structured patient education programs [2]. Characterizing the beliefs held by Libyan asthma patients is an essential prerequisite for designing context-appropriate and locally effective educational and behavioral interventions.
This study aimed to characterize the beliefs and misconceptions about inhaler use among adult asthma patients attending a respiratory clinic in Sebha, Libya, and to examine their associations with inhaler use behavior and clinical outcomes. Two research questions guided the investigation: (1) What specific misconceptions do patients with bronchial asthma hold regarding inhaler use, and (2) In what ways do these beliefs relate to asthma control and healthcare utilization? By generating locally grounded evidence, we aim to inform the development of targeted patient education strategies to improve inhaler adherence and asthma management in the region.

Methods

Study Design and Setting

This was a descriptive cross-sectional study conducted from May 2025 to March 2026 at Sebha Medical Centre and its affiliated outpatient respiratory clinic in Sebha, a major city in the Fezzan region of southern Libya. Sebha Medical Centre serves as the principal secondary-care referral facility for respiratory diseases in the region.

Study Participants

Participants were recruited by convenience sampling from adult patients attending the outpatient respiratory clinic during the study period. Inclusion criteria required: (1) age ≥ 18 years; (2) a confirmed diagnosis of bronchial asthma established on clinical grounds and corroborated by pulmonary function testing (PFT); (3) disease severity classified as mild or moderate; and (4) a current prescription for an inhaler device (either an ICS-alone or an ICS/LABA combination inhaler) issued by the treating physician. Patients with severe asthma or presenting in acute exacerbation were excluded, as were those unable to provide informed consent. A total of 48 participants who met all eligibility criteria were enrolled. Written informed consent was obtained from each participant before enrolment.

Data Collection Instrument

A structured, self-administered questionnaire was developed by the research team based on validated instruments used in comparable studies. [3,5,18] The instrument was initially drafted in English and subsequently translated into Arabic by a bilingual healthcare professional to ensure linguistic accessibility. The questionnaire comprised four sections.

Section A (Demographics)

Collected data on age, gender, education level, occupation, residential location (urban vs. rural), marital status, living arrangement, ethnicity, and self-rated overall health.

Section B (Asthma Disease History)

Enquired about the presence of chronic cough and wheezing, healthcare utilization events in the preceding 12 months (hospitalization, emergency department visits, and missed work or school), and the frequency of respiratory symptoms (daily, weekly, or monthly).

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Section C (Inhaler Use Patterns)
Assessed current inhaler use status, frequency of use (at least twice daily on most days, defined as regular use; vs. intermittent use), and for non-regular users—reasons for not using the inhaler daily, selected from a checklist of 16 options.

Section D (Beliefs About Inhaler Therapy)
Presented eight statements addressing addiction, emergency-only use, public embarrassment, perceived cardiac or pulmonary damage, perceived effectiveness, side-effect avoidance, adequacy of physician instructions, and the desire for further education. Participants rated their level of agreement on a three-point scale: Agree, Not Sure, or Disagree.

Statistical Analysis
Descriptive statistics—including frequencies, percentages, means, and standard deviations—were computed using Minitab Statistical Software (Version 21.1, Minitab LLC, Pennsylvania, USA). Inferential analyses were conducted using the R Statistical Computing Environment (Version 4.2.1, R Foundation for Statistical Computing, Vienna, Austria). Associations between patient beliefs and demographic variables with current inhaler use were evaluated using Chi-square tests of independence; the assumption of expected cell frequencies ≥ 5 was examined for each test. Age was compared between inhaler users and non-users using the Mann–Whitney U test, given its continuous and potentially non-normal distribution. Ordinal relationships between belief severity and clinical outcomes, including chronic cough, hospitalization, emergency department visits, and work or school absences, were assessed using Spearman's rank correlation coefficient. All statistical tests were two-tailed, with the significance level set at $\alpha = 0.05$. Data visualizations were generated using the ggplot2 package in R.

Ethical Considerations
The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the relevant institutional ethics committee prior to study commencement. All participants provided written informed consent before enrolment. No personal identifiable information was retained in the study database.

Results and discussion

Demographic Characteristics
Forty-eight participants were enrolled (Table 1). The mean age was 42.0 years (SD = 15.9; range: 18–82 years), and the sample was predominantly female (64.6%, n = 31). Half of the participants held a university degree (50.0%, n = 24), and the majority were urban residents (72.3%, n = 34). Most participants were married (60.4%, n = 29), nearly all lived in shared households (97.9%, n = 47), and 87.5% (n = 42) identified as Libyan Arab. Self-rated health was perceived positively by 47.9% of participants ("Excellent" or "Very good"); 25.0% rated their health as "Fair" and 2.1% as "Poor".

Asthma Clinical Profile and Healthcare Utilization
Clinical profiling revealed that chronic cough was present in 54.2% of participants (n = 26) and wheezing was reported by the vast majority (81.2%, n = 39; Table 2). During the 12 months preceding the study, 27.1% (n = 13) had requested hospitalization for asthma, and 45.8% (n = 22) had visited the emergency department. An equivalent proportion had missed work or school (45.8%, n = 22). Symptom frequency was distributed across all time scales: 45.8% experienced symptoms monthly, 31.2% daily, and 22.9% weekly. Current inhaler use was reported by 59.6% of participants (n = 28 of 47 with complete data for this item). Among regular inhaler users, 53.6% (n = 15) used their inhaler at least twice daily on most days, while 46.4% (n = 13) reported intermittent use.

Patient Beliefs About Inhaler Use
Analysis of the eight belief items revealed a high overall burden of misconceptions (Figure 1). The most prevalent misconception was the belief that inhalers should be reserved for emergency use, endorsed by 66.7% of participants (n = 32). Over half of respondents (54.2%, n = 26) reported avoiding their inhaler due to fear of side effects, and 33.3% (n = 16) considered inhalers addictive. Concerns about cardiac or pulmonary damage were explicitly endorsed by 14.6% (n = 7), but a further 43.8% (n = 21) were uncertain, representing a substantial reservoir of unaddressed safety concerns. Public embarrassment was reported by 33.3% of participants (n = 16).
Not all beliefs were negative: 64.6% of participants (n = 31) acknowledged that regular inhaler use helps control asthma, and 68.8% (n = 33) felt they had received adequate instructions from their physician.

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However, an overwhelming 83.3% (n = 40) expressed a desire for additional information about their inhaler, signalling a clear and urgent unmet need for patient education.

Associations Between Beliefs, Demographics, and Current Inhaler Use

Chi-square analysis revealed no statistically significant associations between any of the eight belief items and current inhaler use status (all $p > 0.05$; Table 3). This was the case for both the most prevalent misconceptions, emergency-only use ($x^2 = 1.62$, $p = 0.444$) and side-effect avoidance ($x^2 = 3.32$, $p = 0.190$), and the remaining items. Likewise, none of the assessed demographic variables—gender ($x^2 = 0.00$, $p = 1.000$), education level ($x^2 = 4.36$, $p = 0.360$), residential location ($x^2 = 0.16$, $p = 0.694$), or marital status ($x^2 = 2.66$, $p = 0.265$) were significantly associated with inhaler use (Table 4). The Mann–Whitney U test confirmed the absence of a significant age difference between inhaler users (mean 43.8 years) and non-users (mean 39.7 years; $U = 308.5$, $p = 0.362$).

Associations Between Beliefs and Clinical Outcomes

Spearman's rank correlation analysis, conducted to examine ordinal relationships between belief severity and four clinical outcomes, yielded one statistically significant finding (Table 5). Public embarrassment about using an inhaler was positively correlated with the presence of chronic cough (Spearman $r = 0.290$, $p = 0.046$; Figure 2). This indicates that patients who reported greater embarrassment about inhaler use were more likely to experience chronic cough, a recognized marker of suboptimal asthma control. No other belief-outcome pairs reached statistical significance (all $p > 0.05$).

Discussion

This study provides evidence that inhaler-related misconceptions are highly prevalent among asthma patients attending a respiratory clinic in the Fezzan region of Libya. The finding that nearly two-thirds of participants believed inhalers should be used exclusively in emergencies is particularly concerning, as this belief is opposed to the internationally recommended approach of continuous controller therapy irrespective of symptom status [9]. The prevalence of this misconception closely mirrors reports from South Kerala, India [3], and is consistent with the body of literature documenting such beliefs across Africa, Asia, and the Middle East [16–18].

A particularly notable finding was the observation that misconceptions were broadly distributed regardless of educational attainment; half of the sample held university degrees, yet erroneous beliefs were prevalent in this subgroup. This challenges the assumption that formal education is sufficient to confer accurate health knowledge, and points to the functional distinction between general literacy and health literacy.[14] Disease-specific, structured patient education delivered by healthcare providers is therefore indispensable and cannot be substituted by broad educational attainment [7,8].

The absence of statistically significant associations between beliefs and current inhaler use warrants careful interpretation. Several explanations are plausible. First, the relatively small sample size (n = 48) limited statistical power to detect modest associations; the study was not powered for hypothesis testing, and the absence of significant findings should not be interpreted as confirming the null hypothesis. Second, a cross-sectional design cannot establish temporality, and current inhaler use may be influenced by factors not captured in the questionnaire, including physician prescribing habits, medication availability, financial constraints, and symptom severity. Third, as Liu et al. demonstrated in a primary care cohort in Singapore, the relationship between health beliefs and adherence is frequently moderated by practical and contextual determinants that single-domain questionnaires inadequately capture [7].

The significant positive correlation between public embarrassment and chronic cough ($r = 0.290$, $p = 0.046$) is the most clinically relevant finding of this study. The direction of the association suggests that patients who express greater embarrassment about using their inhaler are more likely to report chronic cough, a proxy indicator of suboptimal asthma control. The most plausible mechanistic explanation is that embarrassment leads patients to withhold inhaler use in social settings, resulting in prolonged periods of undermedication, persistent airway inflammation, and consequent cough. This is consistent with the concept of intentional non-adherence driven by psychosocial barriers, as described by Price et al. [8] and Morton et al. [17]. Addressing social stigma around inhaler use requires interventions at multiple levels: individual patient counselling to reframe perceptions of inhaler use as a normal component of disease management; targeted messaging to reduce community-level stigma; and role-modelling by public figures or peers.

The near-universal desire for further information about inhalers (83.3%) represents an immediately actionable finding. The persistence of misconceptions despite 68.8% of participants reporting adequate physician instructions suggests that the content, format, or reinforcement frequency of current educational encounters is insufficient. Evidence supports structured, repeated, and multimodal patient education involving pharmacists, nurses, or respiratory therapists in addition to physicians, as more effective than

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brief opportunistic counselling in modifying asthma-related beliefs and improving adherence [8,15]. Community-based and group-based educational formats may be especially relevant in the Libyan context, given existing health system constraints.

Several limitations should be acknowledged. Convenience sampling from a single respiratory clinic in Sebha restricts generalizability, and the modest sample size (n = 48) limits statistical power for detecting small associations. Self-reported data introduces potential recall and social desirability bias. The cross-sectional design precludes causal inference, and the absence of validated instruments, such as the Beliefs in Medicines Questionnaire or the Morisky Medication Adherence Scale, limits comparability with the broader literature. Future studies should employ larger population-based samples, longitudinal designs, and validated multi-domain tools to more rigorously examine how misconceptions shape adherence and clinical outcomes in the Libyan context.

Conclusion

This cross-sectional study demonstrates that misconceptions regarding inhaler therapy are highly prevalent among adult asthma patients attending a respiratory clinic in Sebha, Libya, with the emergency-only belief (66.7%) and side-effect avoidance (54.2%) being the most common. Misconceptions were present across educational strata, including among university graduates, underscoring the inadequacy of general education as a proxy for health literacy in this context. Although no statistically significant associations were identified between beliefs and current inhaler use—likely reflecting sample size limitations—the significant correlation between public embarrassment about inhaler use and the presence of chronic cough highlights the clinical importance of psychosocial barriers to optimal adherence. The overwhelming desire for further education among participants (83.3%) provides a compelling mandate for the integration of structured, culturally adapted patient education programs into routine asthma care in the region. Future research should employ larger, population-based samples and longitudinal designs to more rigorously characterize the pathways through which misconceptions influence adherence and asthma outcomes.

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Conflict of interest statement

All authors declare that they have no conflicts of interest or competing interests relevant to the content of this manuscript.

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References

1. Braman SS. The global burden of asthma. Chest. 2006 Jul;130(1 Suppl):4S-12S.
2. Cruz AA. Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive approach. Geneva: World Health Organization; 2007.
3. Sulaiman SP, Panicker V. Attitudes of patients with asthma on inhaler use—a cross-sectional study from South Kerala. J Evid Based Med Healthc. 2017;4(26):1505-1509.
4. Ukena D, Fishman L, Niebling WB. Bronchial asthma: diagnosis and long-term treatment in adults. Dtsch Arztebl Int. 2008 May;105(21):385-394.
5. Hand C, Morley S, Adams M. Patients' beliefs about inhalers. Prim Care Respir J. 2000 Mar;8(1):9-11.
6. Kwong KYC, Morphew T, Scott L, Guterman J, Jones CA. Asthma control and future asthma-related morbidity in inner-city asthmatic children. Ann Allergy Asthma Immunol. 2008 Aug;101(2):144-152.
7. Liu C, Tham CW, De Roza J, Chong BY, Koh YL, Tan NC. The association between beliefs and adherence to inhaled controller medication among older adults with asthma: a cross-sectional study in primary care. Patient Prefer Adherence. 2020 Aug 11;14:1351-1359.
8. Price D, Bosnic-Anticevich S, Briggs A, Chrystyn H, Rand C, Scheuch G, et al. Inhaler competence in asthma: common errors, barriers to use and recommended solutions. Respir Med. 2013 Jan;107(1):37-46.
9. Bousquet J, Mantzouranis E, Cruz AA, Aït-Khaled N, Baena-Cagnani CE, Bleecker ER, et al. Uniform definition of asthma severity, control, and exacerbations: document presented for the World Health Organization Consultation on Severe Asthma. J Allergy Clin Immunol. 2010 Nov;126(5):926-938.
10. Newman SP. Improving drug metering to the lung: making the patient the most important factor. Respir Drug Deliv. 2006;1:1-12.
11. Ravandi B, George M, Thompson L, Vangala SV, Chang T, Okelo S. Inhaled corticosteroid beliefs, complementary and alternative medicine in children presenting to the emergency department for asthma. J Asthma. 2021 Oct;58(10):1359-1366.

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https://lmj.ly/index.php/ojs/index eISSN: 2079-1224

12. Lemiere C, Ameille J, Boschetto P, Labrecque M, Pralong JA. Occupational asthma: new deleterious agents at the workplace. Clin Chest Med. 2012 Sep;33(3):519-530.
13. Brooks TL, Leventhal H, Wolf MS, O'Conor R, Morillo J, Martynenko M, et al. Strategies used by older adults with asthma for adherence to inhaled corticosteroids. J Gen Intern Med. 2014 Nov;29(11):1506-1512.
14. McQuaid EL, Everhart RS, Seifer R, Kopel SJ, Mitchell DK, Klein RB, et al. Medication adherence among Latino and non-Latino white children with asthma. Pediatrics. 2012 Jun;129(6):e1404-1410.
15. McQuaid EL. Barriers to medication adherence in asthma: the importance of culture and context. Ann Allergy Asthma Immunol. 2018 Jul;121(1):37-42.
16. Laforest L, El Hasnaoui A, Pribil C, Ritleng C, Osman LM, Schwalm MS, et al. Asthma patients' self-reported behaviours toward inhaled corticosteroids. Respir Med. 2009 Sep;103(9):1366-1375.
17. Morton RW, Everard ML, Elphick HE. Adherence in childhood asthma: the elephant in the room. Arch Dis Child. 2014 Oct;99(10):949-953.
18. Chambers CV, Markson L, Diamond JJ, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. Respir Med. 1999 Feb;93(2):88-94.

Received*: 03-03-2026 -* ***Accepted****: 01-05-2026 -* ***Published****: 09-05-2026*

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Table 1. Demographic characteristics of study participants (N = 48)

Characteristic	Category	n	%	Mean ± SD / Median (IQR)
Age (years)	—	48	—	42.0 ± 15.9
Gender	Female	31	64.6	—
	Male	17	35.4	—
Education Level	University	24	50.0	—
	Secondary	10	20.8	—
	Primary	5	10.4	—
	Intermediate	5	10.4	—
	Postgraduate	4	8.3	—
Residence	Urban	34	72.3	—
	Rural	13	27.7	—
Marital Status	Married	29	60.4	—
	Single	16	33.3	—
	Other	3	6.3	—
Ethnicity	Libyan Arab	42	87.5	—
	Other	6	12.5	—
Self-rated Health	Excellent / Very Good	23	47.9	—
	Good	12	25.0	—
	Fair	12	25.0	—
	Poor	1	2.1	—

Abbreviations: SD, standard deviation; IQR, interquartile range.
Note: Percentages for sub-categories are calculated from the total sample (N = 48) unless otherwise stated. † One participant had missing data for residential location; residence percentages are based on n = 47.

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Table 2. Asthma disease characteristics and healthcare utilization (N = 48)

Characteristic	Category	n	%
Chronic Cough	*Yes*	26	54.2
	No	22	45.8
Wheezing	*Yes*	39	81.2
	No	9	18.8
Hospitalization (past 12 months)	*Yes*	13	27.1
	No	35	72.9
Emergency Department Visit (past 12 months)	*Yes*	22	45.8
	No	26	54.2
Missed Work/School (past 12 months)	*Yes*	22	45.8
	No	26	54.2
Symptom Frequency	*Daily*	15	31.2
	Weekly	11	22.9
	Monthly	22	45.8
Current Inhaler Use*	*Yes*	28	59.6
	No	19	40.4
Frequency of Inhaler Use (among users)	*At least twice daily (regular)*	15	53.6
	Intermittent (some days only)	13	46.4

** One participant had missing data for current inhaler use; percentages for this item are based on n = 47.*
Inhaler use frequency is calculated among current users only (n = 28).
Abbreviation: ED, emergency department.

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Table 3. Chi-square analysis of associations between patient beliefs and current inhaler use (n = 47)*

Belief Statement	Agreement Rate (%)	x^2 Statistic	df	p Value
Inhalers should only be used in emergencies	66.7	1.62	2	0.444
Fear of side effects deters inhaler use	54.2	3.32	2	0.190
Inhalers are addictive	33.3	1.34	2	0.512
Public embarrassment about inhaler use	33.3	—†	—	>0.05
Inhalers help control asthma (positive belief)	64.6	—†	—	>0.05
Inhalers weaken the heart or lungs	14.6	—†	—	>0.05
Received adequate physician instructions	68.8	—†	—	>0.05
Desire for more information about inhalers	83.3	—†	—	>0.05

** One participant had missing data for current inhaler use.*
† Exact x^2 values not separately reported in the statistical output; all non-reported associations were non-significant ($p > 0.05$).
Agreement rate = proportion of participants selecting the 'Agree' response option.
All associations were evaluated using Chi-square tests of independence with df = 2 (three response categories: Agree, Not Sure, Disagree).

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Table 4. Chi-square and Mann–Whitney U analyses of demographic factors and current inhaler use (n = 47)*

Demographic Variable	Inhaler Users n = 28 (%)	Non-users n = 19 (%)	Test Statistic	p Value
Gender	—	—	$x^2 = 0.00$	1.000
Education Level	—	—	$x^2 = 4.36$	0.360
Residence (urban vs. rural)	—	—	$x^2 = 0.16$	0.694
Marital Status	—	—	$x^2 = 2.66$	0.265
Age (years), mean	43.8	39.7	U = 308.5‡	0.362

** One participant had missing data for current inhaler use.*
‡ Mann–Whitney U statistic; age between groups was compared using a non-parametric test given potential non-normality. Inhaler users: mean age 43.8 years; non-users: mean age 39.7 years.
Abbreviations: U, Mann–Whitney U statistic; x^2, Chi-square statistic.
— Exact counts within subgroups not available from the statistical output; all results refer to complete-case analysis.

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Table 5. Spearman rank correlation analyses: patient beliefs and clinical outcomes (N = 48)

Belief Statement	Clinical Outcome	Spearman r	p Value
Public embarrassment about inhaler use	Chronic cough	0.290*	0.046 *
Public embarrassment about inhaler use	Hospitalization (past 12 months)	—†	>0.05
Public embarrassment about inhaler use	Emergency department visit	—†	>0.05
Public embarrassment about inhaler use	Missed work/school	—†	>0.05
Emergency-only use belief	Chronic cough	—†	>0.05
Addiction belief	Chronic cough	—†	>0.05
Side-effect avoidance	Chronic cough	—†	>0.05
Cardiac/pulmonary damage fear	Chronic cough	—†	>0.05

** Statistically significant ($p < 0.05$).*
† Exact Spearman r values not separately reported in the statistical output for non-significant results. All eight belief items were correlated against all four clinical outcomes; only one significant result was identified.
Abbreviation: r, Spearman rank correlation coefficient.

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FIGURE LEGENDS

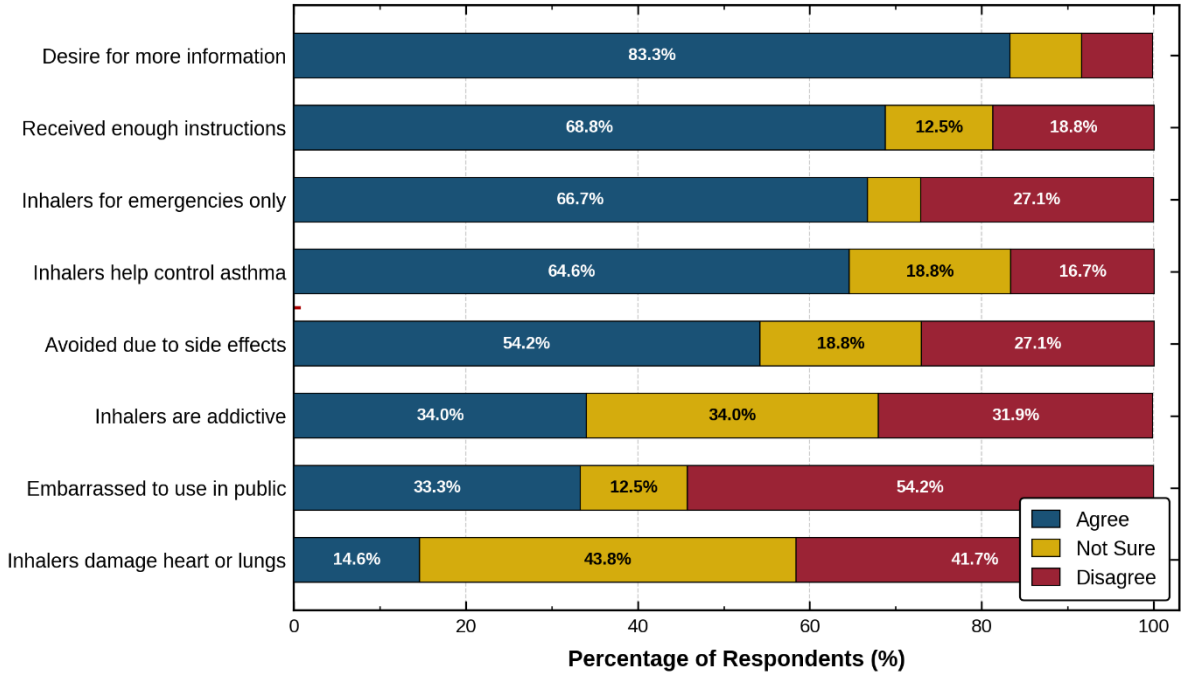

Figure 1. Distribution of responses to eight inhaler-related belief statements among adult asthma patients in Sebha, Libya (N = 48).

Responses are displayed as stacked horizontal bars representing the proportions of participants selecting each of the three response categories (Agree, Not Sure, Disagree) for each belief item. Items are arranged in descending order of agreement rate. The stacked bars illustrate the relative contributions of each response category and highlight the predominance of the emergency-only belief (66.7% agreement) and side-effect fear (54.2% agreement) as the most prevalent misconceptions.

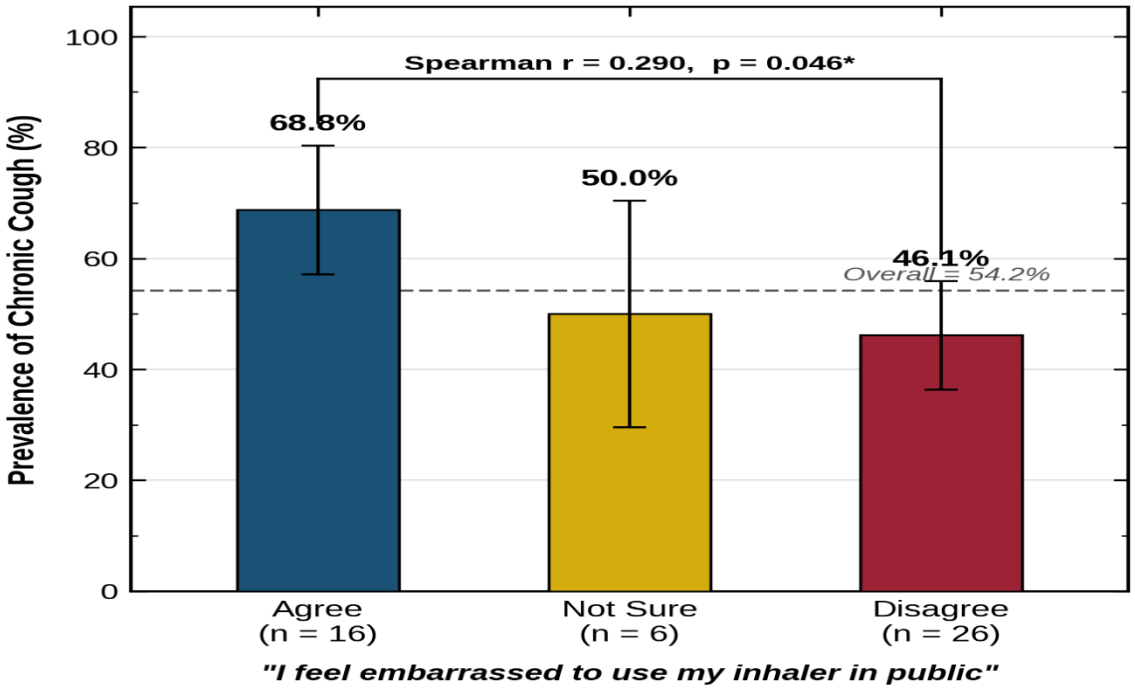

Figure 2. Prevalence of chronic cough stratified by response to the public embarrassment item among adult asthma patients in Sebha, Libya (N = 48).

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The grouped bar chart depicts the percentage of participants reporting chronic cough across the three response categories for the statement "I feel embarrassed to use my inhaler in public" (Agree, Not Sure, Disagree). Spearman rank correlation analysis identified a statistically significant positive association between greater embarrassment about inhaler use and the presence of chronic cough ($r = 0.290$, $p = 0.046$), suggesting that social inhibition of inhaler use may contribute to suboptimal airway symptom control.

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