

PHYTOCHEMISTRY, PHARMACOLOGY, NUTRITIONAL COMPOSITION, AND ETHNOMEDICINAL SIGNIFICANCE OF *JATROPHA TANJORENSIS* (HOSPITAL TOO FAR) LEAVES: A SCOPING REVIEW

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ABSTRACT

Jatropha tanjorensis J.L. Ellis & Saroja (Euphorbiaceae), popularly known as *hospital too far* in Nigeria, is a leafy vegetable and an ethnomedicinal plant traditionally used for anaemia, diabetes, and malaria. This scoping review maps evidence on the phytochemistry, pharmacology, toxicology, nutritional composition, and ethnomedicinal significance of *J. tanjorensis* leaves. Following the Arksey and O'Malley framework and PRISMA-ScR guidelines, 43 peer-reviewed sources were identified through PubMed, Google Scholar, ScienceDirect, AJOL, Scopus, and Web of Science. Flavonoids, tannins, saponins, terpenoids, steroids, and cardiac glycosides are consistently reported. GC-MS and LC-MS/MS chemical elucidations identified over 50 compounds, including phytol, benzenetriol derivatives, and flavonoid glycosides. Preclinical evidence documents anti-anaemic, hepatoprotective, antimicrobial, antidiabetic, and antimalarial activities, but antioxidant potency is weak and variable, and reproductive activity findings are directly contradictory, as no human clinical trials were identified. The ethnopharmacological evidence base of *J. tanjorensis* is heterogeneous and exclusively preclinical. Standardized assay protocols, dose-response studies, and human trials are priorities.

Keywords: *Jatropha tanjorensis*, *hospital too far*, phytochemicals, anti-anaemic activity, scoping review.

INTRODUCTION

Jatropha tanjorensis J.L. Ellis & Saroja (family Euphorbiaceae) is a shrub first described from Tamil Nadu, India, and subsequently shown by cytological and peroxidase isozyme studies to be a natural interspecific hybrid between *Jatropha curcas* L. and *Jatropha gossypifolia* L., exhibiting intermediate phenotypic characters between its two parent species and complete pollen sterility (Ellis & Saroja, 1961; Prabakaran & Sujatha, 1999). Comparative morphological and anatomical studies of the leaf and stem confirm this intermediacy relative to *J. curcas* (Idu *et al.*, 2009). Despite its Indian taxonomic origin, *J. tanjorensis* has become naturalized and widely cultivated across Nigeria, where it is grown as a fence plant and leafy vegetable and is known by

many local names reflecting its perceived medicinal potency. It is most famously termed "*hospital too far*" in Nigerian Pidgin English, alongside "*lyana-lpaja*" (Yoruba), "*ugu oyibo*" (Igbo), and Catholic vegetable, reverend father vegetable, chaya leaf, tree spinach, and miracle leaf in wider informal use (Iwalewa *et al.*, 2005; Oladele *et al.*, 2020).

The plant's Nigerian common name, *hospital too far*, derives from a widespread lay belief that regular consumption of the leaves is so protective of health that hospital visits become unnecessary; this belief is most strongly associated with the plant's traditional use in managing anaemia, alongside reported traditional uses for diabetes, malaria, hypertension, and general debility (Olayiwola *et al.*, 2004; Oladele *et al.*, 2020). This traditional profile has motivated substantial primary research, particularly from Nigerian university-based departments of biochemistry and pharmacology, focused on evaluating the phytochemical composition, antioxidant capacity, and organ-specific pharmacological effects of *J. tanjorensis* leaf extracts, predominantly in rodent models.

Qualitative phytochemical screening across independent studies reports flavonoids, tannins, saponins, terpenoids, steroids, and cardiac glycosides in *J. tanjorensis* leaf extracts, though alkaloid and anthraquinone status varies by study and extraction method (Iwalewa *et al.*, 2005). More detailed chromatographic work has identified specific bioactive constituents: gas chromatography-mass spectrometry (GC-MS) of methanolic leaf extract identified 57 compounds dominated by 1,2,3-benzenetriol, while essential-oil GC-MS identified phytol as the dominant constituent, and liquid chromatography-tandem mass spectrometry (LC-MS/MS) has characterized more than 20 flavonoid glycosides and a tannin-rich fraction containing chlorogenic acid, caffeic acid, ferulic acid, rutin, and ursolic acid. This chemical profile provides a plausible basis for the antioxidant, hepatoprotective, antidiabetic, antimicrobial, and anti-anaemic activities reported across the pharmacological literature.

Notably, however, the evidence is not uniformly consistent: antioxidant potency values vary across studies by nearly four-fold, and the reproductive/toxicological literature contains directly

conflicting findings, with some studies reporting fertility-enhancing effects and others reporting antifertility effects at broadly comparable doses. As with many widely consumed African leafy vegetables studied primarily through single-laboratory, small-sample rodent experiments, the existing literature has not been systematically mapped, compared, or critically weighed as a body of evidence. Given *J. tanjorensis*'s status as both a significant informal dietary component and a subject of active pharmacological investigation in Nigeria, a structured scoping review is needed to consolidate what is known, identify where the evidence agrees and disagrees, and set priorities for the standardized, dose-ranging, and eventually human research needed to responsibly evaluate the plant's therapeutic and nutritional claims.

MATERIALS AND METHODS

Protocol and Reporting

This review followed the five-stage scoping-review framework originally proposed by Arksey and O'Malley (Arksey & O'Malley, 2005) and subsequently refined by Levac *et al.* (2010): (i) identifying the research question, (ii) identifying relevant studies, (iii) study selection, (iv) charting the data, and (v) collating, summarizing, and reporting results. Reporting followed the PRISMA extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco *et al.*, 2018). Consistent with standard scoping-review methodology, we did not formally score individual studies for risk of bias; instead, we describe the narrative confidence-rating approach used.

Research Questions

The review addressed six linked questions: (1) What classes of phytochemicals and specific GC-MS/LC-MS-identified compounds have been reported in *J. tanjorensis* leaves? (2) What antioxidant assays have been applied, and what potency (IC₅₀) values have been reported relative to standard antioxidants? (3) What pharmacological activities, including the plant's signature anti-anaemic use, have been documented? (4) What toxicological and reproductive safety signals have been documented, and how consistent are they? (5) What is *J. tanjorensis*'s nutritional composition, taxonomic origin, and ethnomedicinal/ethnobotanical significance in Nigeria? (6) How internally consistent is the assembled evidence base, and where does it disagree?

Eligibility Criteria

Inclusion Criteria: peer-reviewed original research articles and reviews, published predominantly in English, reporting qualitative or quantitative phytochemical screening, GC-MS/LC-MS phytochemical profiling, *in vitro* or *in vivo* pharmacological/toxicological activity, proximate/nutritional/mineral composition, taxonomic or agronomic characterization, or ethnobotanical/ethnomedicinal data on *Jatropha tanjorensis* leaves (or, for taxonomic-origin sources, the whole plant).

Exclusion Criteria: studies focused exclusively on other *Jatropha* species (principally *J. curcas* and *J. gossypifolia*) without direct comparative data on *J. tanjorensis*; non-peer-reviewed sources lacking retrievable full text or verifiable authorship (a substantial number of freely circulating lay-audience articles on this plant were excluded on this basis); duplicate or overlapping datasets from the same research group where a fuller version existed; and sources whose full author list could not be confirmed from at least two independent bibliographic records, since this review declines to attribute claims to unverified or potentially fabricated authorship.

Information Sources and Search Strategy

Sources were identified through PubMed, Google Scholar, ScienceDirect, Africa Journals Online (AJOL), Semantic Scholar, Scopus, and Web of Science, supplemented by citation tracking (backward and forward snowballing). Searches combined the population terms ("*Jatropha tanjorensis*" OR "hospital too far" OR "chaya leaf") with concept terms ("phytochemical*", "GC-MS", "LC-MS", "antioxidant*", "DPPH", "anti-anaemic", "haematinic", "proximate composition", "pharmacology", "toxicity", "reproductive", "ethnobotany") using Boolean operators, in the representative form: ("*Jatropha tanjorensis*" OR "hospital too far") AND ("phytochemical*" OR "GC-MS" OR "antioxidant*" OR "pharmacology" OR "toxicity" OR "nutrient*" OR "ethnobotany"). Searches were conducted iteratively in July 2026.

A note on methodological transparency: this review was conducted as an evidence-mapping exercise using iterative search-engine and academic-database queries rather than a single formal Boolean string executed and logged against each database's native interface. Exact per-database record counts, and the number of records excluded at each screening stage, were not separately tracked in a fully auditable log; Figure 1 presents an illustrative, order-of-magnitude PRISMA-ScR flow consistent with the sources actually retained, not a certified systematic-search audit trail. A distinctive feature of this particular literature is the large volume of freely circulating lay-audience blog content on *J. tanjorensis*'s purported health benefits; a substantial screening effort in this review was directed at excluding such content and retaining only sources with verifiable peer-reviewed provenance and confirmed authorship, which likely accounts for a higher-than-typical exclusion rate at the eligibility stage (Figure 1). Researchers wishing to reproduce this search as a fully auditable, dual-reviewer systematic search should run the Boolean strings above directly in each database, log per-database yields and exclusion reasons in a reference manager, and have a second reviewer independently screen titles/abstracts and full texts.

Selection of Sources of Evidence

Titles and abstracts of retrieved records were screened against the eligibility criteria, followed by full-text assessment of potentially relevant articles. Figure 1 summarizes the flow of records through identification, screening, eligibility assessment, and inclusion

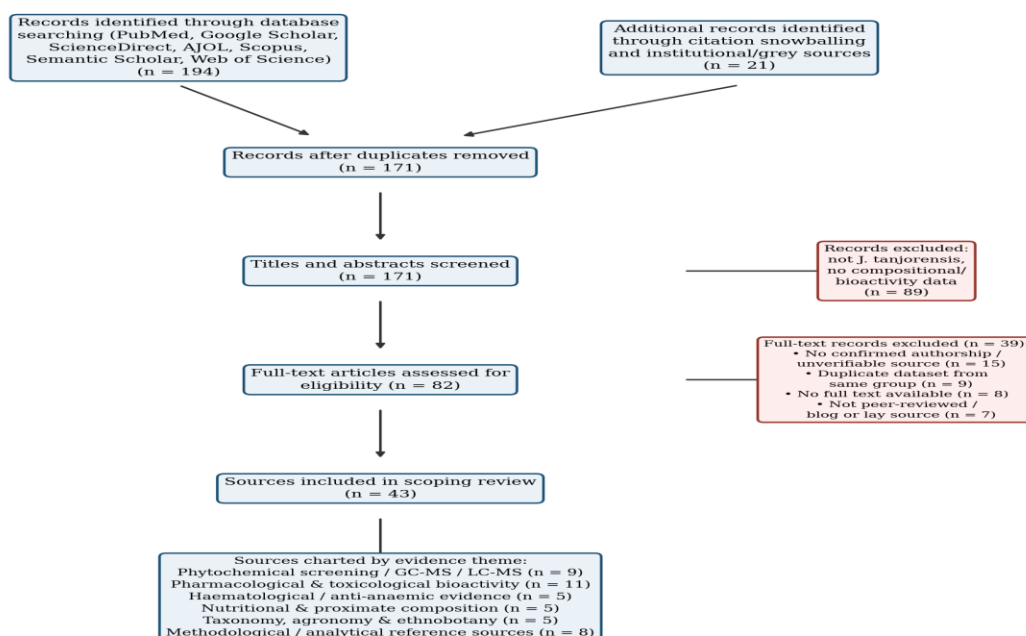


Figure 1. PRISMA-ScR flow diagram of source identification, screening, eligibility assessment, and inclusion for this scoping review.

Data Charting and Synthesis

For each included source, we charted the extraction solvent/method or study design, analytical method (qualitative screening reagents, GC-MS, LC-MS/MS, spectrophotometric antioxidant assay, molecular docking, animal model), and principal quantitative or qualitative findings. Data were synthesized narratively and organized thematically into phytochemical classes, GC-MS/LC-MS-identified compounds, antioxidant potential, pharmacological/toxicological activity (including the anti-anaemic literature specifically, given its ethnomedicinal centrality), nutritional composition, and taxonomic/agronomic/ethnobotanical significance, with results tabulated for comparison across studies.

Standard Analytical and Pharmacognostic Reference Methods

Qualitative phytochemical screening across the included studies generally follows standard pharmacognostic reagent-based protocols (Harborne, 1998; World Health Organization, 1998; Bruneton, 1999; Trease & Evans, 2002; Sofowora, 2008). Spectrophotometric antioxidant assays draw on established DPPH (Brand-Williams *et al.*, 1995), FRAP (Benzie & Strain, 1996), ABTS (Re *et al.*, 1999), nitric oxide-scavenging (Marcocci *et al.*, 1994), and TBARS/lipid-peroxidation (Ohkawa *et al.*, 1979) methods. Proximate and mineral composition analyses generally follow AOAC International reference protocols (AOAC International, 2005), and total phenolic and flavonoid content are commonly quantified via Folin-Ciocalteu (Singleton & Rossi, 1965) and aluminium-chloride/flavonoid colorimetric methods (Zhishen *et al.*,

1999). Anticholinesterase-relevant assay methodology used in comparator studies follows Ellman's colorimetric method (Ellman *et al.*, 1961). Because assay conditions vary somewhat between these original protocols and their adaptations in individual *J. tanjorensis* studies, IC₅₀ and concentration values reported across studies are not strictly interchangeable.

Quality and confidence appraisal approach

As a scoping review, we did not apply a formal risk-of-bias instrument to individual studies, consistent with standard PRISMA-ScR guidance. Each major evidence theme in Section 3 was instead assigned a narrative confidence rating of high, moderate, or limited, based on (i) whether findings were replicated by more than one independent research group, (ii) whether the direction of effect was consistent across studies using different extraction solvents, assay conditions, or animal models, and (iii) the position of the underlying study designs on the evidence hierarchy described in Section 3.10. This is a transparent, judgement-based classification rather than a validated bias-risk score, and is presented as such in Table 8.

RESULTS

Forty-three sources met the eligibility criteria and form the evidentiary basis of this review (Figure 1). Figure 2 shows the distribution of included sources by publication period, and Figure 3 shows their distribution across evidence themes. Table 1 summarizes representative sources across these themes.

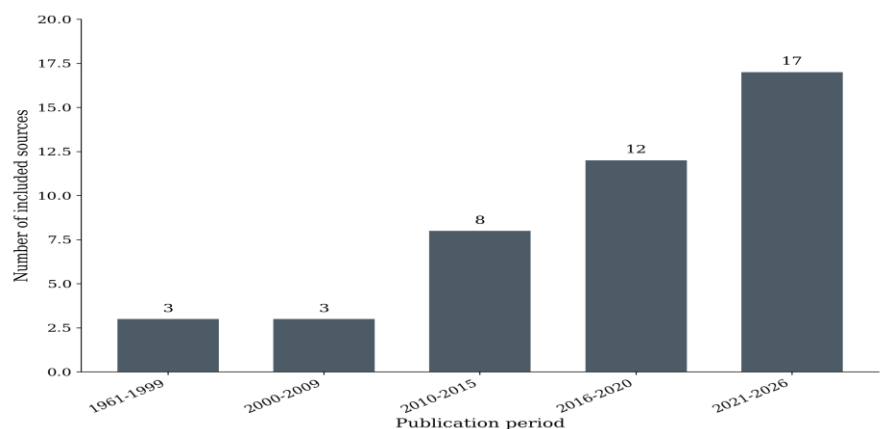


Figure 2. Distribution of included sources by publication period (n = 43).

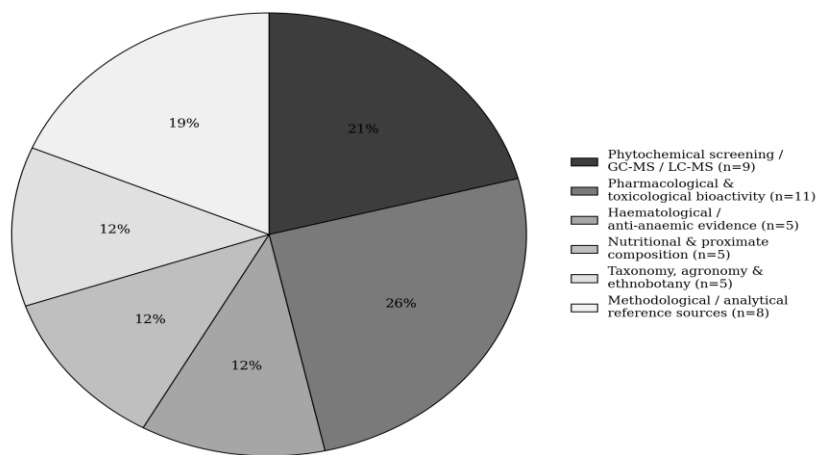


Figure 3. Distribution of included sources by evidence theme (n = 43).

Table 1: Representative characteristics of sources included in this scoping review, organized by evidence theme

Ref.	Focus	Study Type	Key Contribution
(Ellis & Saroja, 1961; Prabakaran & Sujatha, 1999)	Taxonomic origin	Cytological / isozyme survey	Establishes <i>J. tanjorensis</i> as a natural <i>J. curcas</i> x <i>J. gossypifolia</i> hybrid
(Idu <i>et al.</i> , 2009)	Leaf and stem morphology	Comparative anatomy	Confirms morphological intermediacy relative to parent species
(Iwalewa <i>et al.</i> , 2005)	Phytochemical screening	Qualitative screening, multi-species comparison	Establishes core phytochemical class profile; alkaloid status variable
(Sabandar <i>et al.</i> , 2013; Bennett <i>et al.</i> , 2024)	GC-MS / LC-MS profiling	Chromatographic bioactive-compound analysis	Identifies 20+ flavonoid glycosides, tannin-rich phenolic acid profile
(Ehimwenma, 2009; Idu <i>et al.</i> , 2014; Umoren <i>et al.</i> , 2023a)	Anti-anaemic activity	In vivo (rat/rabbit) haematology	Increased PCV, haemoglobin, RBC in protein-malnourished and anaemic models
(Olayiwola <i>et al.</i> , 2004)	Antidiabetic activity	In vivo (rat) and <i>in vitro</i> (INS-1 cells)	Hypoglycaemic effect in glucose-loaded rats; limited insulin-secretion effect <i>in vitro</i>

Ref.	Focus	Study Type	Key Contribution
(Arun <i>et al.</i> , 2014; Osuchukwu <i>et al.</i> , 2016; Oladele <i>et al.</i> , 2020)	Hepatoprotective/reproductive toxicology	In vivo (rat) organ-specific pharmacology	Protective in CCl ₄ /sodium-benzoate/aspirin models; reproductive hormone effects contested
(Babayemi <i>et al.</i> , 2021; Umoren <i>et al.</i> , 2023b)	Antimicrobial/haematological toxicology	In vivo and <i>in vitro</i>	Antibacterial activity against clinical wound isolates; conflicting haematological direction
(Oladele <i>et al.</i> , 2020; Jumare <i>et al.</i> , 2024)	Antimalarial/molecular docking	In vitro and <i>in silico</i>	Antiplasmodial activity; docking against <i>P. falciparum</i> drug targets
(Viswanathan <i>et al.</i> , 2018)	Wound healing	In vivo (rat) excision/incision model	Comparable wound-closure time to nitrofurazone standard
(Egbon <i>et al.</i> , 2013; Nwachukwu, C. N., 2018; Abubakar <i>et al.</i> , 2022)	Nutritional/proximate / mineral composition	Analytical chemistry	Wide inter-study variability in mineral and vitamin content

Taxonomic origin and identity

J. tanjorensis is not a naturally occurring species in the traditional sense but a natural interspecific hybrid between *J. curcas* and *J. gossypifolia*, first documented in Tamil Nadu, India through field survey, cytological examination, and peroxidase isozyme analysis, which together demonstrated intermediate phenotypic characters, complete pollen sterility, and abnormal meiosis consistent with hybrid origin (Prabakaran & Sujatha, 1999). The species was formally described morphologically a generation earlier, while comparative anatomical work confirms that *J. tanjorensis* leaf and stem structures are morpho-intermediates between the two parent species (Ellis & Saroja, 1961; Idu *et al.*, 2009). This hybrid origin is a useful interpretive anchor for the phytochemical findings in Sections 3.2-3.3: because *J. tanjorensis* is genetically intermediate between two chemically well-characterized congeners, its phytochemical profile might plausibly be expected to combine, rather than uniquely diverge from, the known chemistry of *J. curcas* and *J. gossypifolia*, though no included study directly tested this

hypothesis.

Phytochemical Classes Reported

Qualitative phytochemical screening of *J. tanjorensis* leaf extracts converges on the consistent presence of flavonoids, tannins, saponins, terpenoids, steroids, and cardiac glycosides. Alkaloid and anthraquinone status is less consistent: several studies report alkaloids present, while a direct comparative screening against two other medicinal leaf extracts found *J. tanjorensis* negative for alkaloids while testing positive for saponins, tannins, flavonoids, terpenoids, and steroids (Iwalewa *et al.*, 2005). Total phenolic content has been reported at 11.35 mgGAE/g in one methanolic-extract study and 36.48 mgGAE/g in another, with corresponding total flavonoid content of 15.91 and 145.92 mgQE/g, respectively, an approximately nine-fold difference plausibly attributable to differences in extraction solvent, leaf maturity, or growing conditions between studies. Table 2 summarizes the qualitative phytochemical profile.

Table 2: Phytochemical classes reported in *J. tanjorensis* leaf across included studies.

Phytochemical Class	Reported Status	Consistency Across Studies
Flavonoids	Present	Consistent
Tannins	Present	Consistent
Saponins	Present	Consistent
Terpenoids	Present	Consistent
Steroids	Present	Consistent
Cardiac glycosides	Present	Consistent
Alkaloids	Present in most studies; absent in at least one	Inconsistent

Phytochemical Class	Reported Status	Consistency Across Studies
Anthraquinones	Present in some studies; absent in others	Inconsistent
Phenols	Present	Consistent, but quantified value varies widely

GC-MS and LC-MS/MS-identified Compounds

Three independent chromatographic studies illustrate both the depth and the heterogeneity of *J. tanjorensis*'s identified chemical profile. GC-MS analysis of methanolic leaf extract identified 57 bioactive compounds, with 1,2,3-benzenetriol (66.38%), 1,3,5-benzenetriol (8.82%), catechol (6.84%), n-hexadecanoic acid (2.08%), and 9-octadecadienoic acid among the major constituents, in a study targeting antibacterial applications. In a separate essential-oil GC-MS study, 20 components comprising the full essential-oil profile were identified, with phytol (41.38%), (+)-spathulenol (12.81%), epi- α -cadinol (9.27%), (-)-caryophyllene oxide (4.79%), germacrene D (4.46%), and α -cadinol (3.86%) as the dominant constituents, which is a markedly different compound profile from the benzenetriol-dominated methanolic extract, thus illustrating substantial extract-type-dependent variation in identified

chemistry. LC-MS/MS analysis of methanolic leaf extract identified a complex mixture of approximately 20 flavonoids, predominantly glycosides, including isorhamnetin-3-glucoside-4'-glucoside, delphinidin-3-O-2"-O- β -xylopyranosyl- β -glucopyranoside, and 6-C-hexosyl-8-C-pentosyl apigenin, while a related LC/ESI/MS/MS study identified flavone glucosides (homoorientin, kaempferol-3-O-rutinoside, luteolin-7-O-glucoside, naringin, vitexin), flavonols (kaempferol, kaempferide), and flavones (baicalein, diosmetin) with associated anticancer activity attributed *in silico* to vitexin and 6-C-pentosyl-8-C-hexosyl apigenin binding to Bcl-2 family proteins. A separate GC-MS study of a tannin-rich fraction identified chlorogenic acid, caffeic acid, ferulic acid, resveratrol, rutin, ursolic acid, and rosmarinic acid, compounds associated with the fraction's hepatoprotective activity against methotrexate-induced liver injury. Table 3 summarizes representative identified compounds.

Table 3: Representative GC-MS- and LC-MS/MS-identified compounds in *J. tanjorensis* leaf extracts across independent studies

Compound / Class	Extract Type	Approx. Abundance / Note	Source
1,2,3-Benzenetriol	Methanolic leaf extract	66.38% (dominant, of 57 compounds)	(Babayemi <i>et al.</i> , 2021)
Phytol	Leaf essential oil	41.38% (dominant, of 20 compounds)	(Bennett <i>et al.</i> , 2024)
(+)-Spathulenol	Leaf essential oil	12.81%	(Bennett <i>et al.</i> , 2024)
Flavonoid glycosides (~20 identified)	Methanolic leaf extract	Predominantly glycosides, few aglycones	(Sabandar <i>et al.</i> , 2013)
Vitexin, 6-C-pentosyl-8-C-hexosyl apigenin	Methanolic leaf extract	Implicated <i>in silico</i> in anticancer activity via Bcl-2 binding	(Yahaya <i>et al.</i> , 2026)
Chlorogenic acid, caffeic acid, ferulic acid, rutin, ursolic acid, resveratrol, rosmarinic acid	Tannin-rich leaf fraction	Associated with hepatoprotective effects	(Bennett <i>et al.</i> , 2024)

Antioxidant potential

Reported antioxidant potency for *J. tanjorensis* leaf extracts is notably more variable, and generally weaker relative to reference standards, than for some other well-studied African medicinal leaves. One study of methanolic extract reported a DPPH IC₅₀ of 49.7 μ g/mL alongside a lipid-peroxidation-inhibition IC₅₀ of 189.6 μ g/mL. A separate study reported a substantially weaker DPPH IC₅₀ of 185.02 μ g/mL for methanol extract against an ascorbic acid standard IC₅₀ of 5.15 μ g/mL, a roughly 36-fold potency gap. A third comparative study of nine southwestern Nigerian edible vegetables

found *J. tanjorensis* extract to have weak antioxidant activity (10.7-12.1% activity range), markedly lower than *Crassocephalum rubens* (56.5%) and moderate performers such as *Vernonia amygdalina*, while nitric-oxide-scavenging activity of *J. tanjorensis* was not significantly different from the standard L-ascorbic acid in a fourth comparative study against *Hibiscus sabdariffa*. Total phenolic and flavonoid content, as noted in Section 3.2, similarly varies severalfold across studies. Table 4 summarizes representative reported values.

Table 4: Antioxidant activity reported for *Jatropha tanjorensis* leaf extracts across independent studies, illustrating substantial inter-study variability

Assay	Extract	Reported IC ₅₀ / Activity	Reference Standard
DPPH	Methanolic leaf extract (Study A)	49.7 µg/mL	Not reported in same study
DPPH	Methanolic leaf extract (Study B)	185.02 µg/mL	Ascorbic acid: 5.15 µg/mL
Lipid peroxidation inhibition	Methanolic leaf extract (Study A)	189.6 µg/mL	Not reported in the same study
Comparative antioxidant activity (9 vegetables)	Methanolic leaf extract	10.7-12.1% (weak, lowest-tier of 9 vegetables tested)	<i>Crassocephalum rubens</i> : 56.5% (highest)
Nitric oxide scavenging	Aqueous leaf extract	Not significantly different from ascorbic acid	L-ascorbic acid

Quantitative Synthesis of Reported Antioxidant Values

Table 5 summarizes the minimum, maximum, mean, and median DPPH IC₅₀ values reported with sufficient numeric detail across the included sources. These summary statistics restate a genuinely heterogeneous and narrow evidence base rather than a pooled meta-analytic estimate; no formal meta-analysis was attempted

given the marked heterogeneity of extraction solvents and reported potency across the two directly comparable DPPH studies located. The narrow and wide range (particularly for DPPH IC₅₀ and flavonoid content) themselves constitute a finding: this literature has not yet converged on consistent quantitative values, in contrast to some other well-studied medicinal leaves.

Table 5: Quantitative synthesis of antioxidant and phenolic/flavonoid content values reported for *J. tanjorensis* leaf extracts.

Endpoint	n (independent values)	Min	Max	Mean	Median
DPPH IC ₅₀ (µg/mL), methanolic extract	2	49.7	185.02	117.4	117.4
Lipid peroxidation inhibition IC ₅₀ (µg/mL)	1	189.6	189.6	189.6	189.6
Total phenolic content (mgGAE/g)	2	11.35	36.48	23.9	23.9
Total flavonoid content (mgQE/g)	2	15.91	145.92	80.9	80.9

The Anti-anaemic Literature (Signature Ethnomedicinal Use)

Because anti-anaemic activity is *J. tanjorensis*'s most culturally central claimed biological property, and the direct basis for its "hospital too far" name, this theme is addressed separately from the wider pharmacological literature. Multiple independent studies support anti-anaemic activity: leaf-supplemented feed increased packed cell volume, haemoglobin, platelets, total protein, and albumin in protein-malnourished rats relative to controls, with the leaf-supplemented group showing normal liver and kidney histology compared with severe fatty changes in protein-deficient controls, suggesting an antioxidative mechanism underlying the anti-anaemic effect (Idu *et al.*, 2014; Ehimwenma, 2009). A related toxicological study similarly reported increased packed cell volume, red blood cells, and haemoglobin following leaf extract administration (Umoren *et al.*, 2023a). Feed-mash toxicology in rabbits found no significant weight change and improved renal filtration markers at study doses (Ehimwenma, 2009). However, at least one study using ethanolic leaf extract in prepubertal male rats reported the opposite direction of effect: significant decreases in red blood cell count, white blood cell count, haemoglobin concentration, packed cell volume, and neutrophils relative to control (Babayemi *et al.*, 2021). This is a genuine, unresolved contradiction in the anti-anaemic literature.

Wider Pharmacological and Bioactivity Profile

Beyond its anti-anaemic use, *J. tanjorensis* leaf extract has

demonstrated hepatoprotective activity across several independent hepatotoxicity models: protection against carbon tetrachloride-induced oxidative stress (Arun *et al.*, 2014), against sodium-benzoate-mediated renal and hepatic dysfunction (with significant reversal of altered kidney and liver damage markers and cellular architecture) (Oladele *et al.*, 2020), against aspirin-induced hepatotoxicity with maintained electrolyte balance (Umoren *et al.*, 2023a), and against methotrexate-induced liver injury, where a tannin-rich fraction significantly reduced elevated ALT, AST, ALP, bilirubin, and malondialdehyde levels relative to untreated controls, at a magnitude comparable to the standard drug silymarin (Yahaya *et al.*, 2026). Antidiabetic activity has been demonstrated as a hypoglycaemic effect in glucose-loaded rats at 2 g/kg extract, an effect not observed at 1 g/kg, with limited *in vitro* insulin-secretion activity confined to the ethyl acetate fraction using INS-1 cells (Olayiwola *et al.*, 2004); a separate high-fat-diet rat study found ethanolic extract reduced weight gain, feed intake, serum glucose, and lipid profile, with increased antioxidant enzyme activity (Amaechi *et al.*, 2023).

Antimicrobial activity has been demonstrated against clinical wound-associated bacterial isolates including *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Salmonella typhi*, and *Staphylococcus aureus* using agar well diffusion, with saponin content identified as the most abundant phytochemical in the most active (methanolic) extract (Babayemi *et al.*, 2021).

Antiplasmodial activity has been reported both *in vitro*, where ethyl acetate extract fractions showed IC₅₀ values of 4.77 and 4.98 µg/mL against early and late trophozoite stages of *Plasmodium falciparum* respectively, and via molecular docking, where bioactive compounds including phytol showed favourable binding energies (e.g., -8.3 kcal/mol against *P. falciparum* erythrocyte membrane protein 1) against multiple *P. falciparum* drug-target receptors including apical membrane antigen 1, multidrug-resistant protein 1, and plasmepsin X (Jumare *et al.*, 2024). Wound-healing activity has been demonstrated in excision and incision rat models, with methanol extract ointment (5% w/w) and isolated stigmaterol (0.2% w/w) achieving wound-closure times comparable to the standard nitrofurazone ointment (Viswanathan *et al.*, 2018).

Set against this pharmacological promise, a substantial and genuinely contradictory reproductive-toxicology literature exists. Several studies report fertility-enhancing effects: aqueous extract

improved sperm motility, count, and morphology alongside increased testosterone and FSH in adult male rats (Arun *et al.*, 2014); a separate study found testosterone levels significantly higher across all treatment groups relative to control with no histological testicular distortion; and virgin female rats given aqueous extract before and during mating showed improved pregnancy rates, increased FSH and estrogen, and improved offspring birth weight (Ukoh *et al.*, 2022). Conversely, other studies report antifertility effects at broadly comparable doses: methanolic extract significantly decreased testosterone, FSH, and LH with reduced epididymal sperm count and motility (Osuchukwu *et al.*, 2016). These conflicting findings are addressed directly in Section 3.12 and Section 4.4.

Table 6b summarizes these findings for direct cross-study comparison.

Table 6b. Comparison of pharmacological and toxicological findings for *Jatropha tanjorensis* leaf extract across independent studies, beyond the anti-anaemic literature summarized separately.

Activity	Model / Design	Key Finding	Reference
Hepatoprotective (CCl ₄)	In vivo rat	Protection against carbon tetrachloride-induced oxidative stress	Arun <i>et al.</i> , 2014
Hepatoprotective (sodium benzoate)	In vivo rat	Significant reversal of altered kidney/liver damage markers and cellular architecture	Oladele <i>et al.</i> , 2020
Hepatoprotective (aspirin)	In vivo rat	Reduced hepatotoxicity with maintained electrolyte balance	Umoren <i>et al.</i> , 2023a
Hepatoprotective (methotrexate)	In vivo rat, tannin-rich fraction	Reduced ALT, AST, ALP, bilirubin, MDA; comparable to silymarin	Yahaya <i>et al.</i> , 2026
Antidiabetic	Glucose-loaded rats; INS-1 cells (in vitro)	Hypoglycaemic at 2 g/kg (not at 1 g/kg); limited in vitro insulin secretion	Olayiwola <i>et al.</i> , 2004
Antidiabetic / anti-obesity	High-fat-diet rat	Reduced weight gain, feed intake, glucose, lipid profile; increased antioxidant enzymes	Amaechi <i>et al.</i> , 2023
Antimicrobial	Agar well diffusion, clinical wound isolates	Active against <i>E. coli</i> , <i>P. aeruginosa</i> , <i>K. pneumoniae</i> , <i>S. typhi</i> , <i>S. aureus</i>	Babayemi <i>et al.</i> , 2021
Antiplasmodial	In vitro (trophozoite IC ₅₀) and in silico (docking)	IC ₅₀ 4.77-4.98 microgram/mL; docking vs AMA1, MDR1, plasmepsin X	Jumare <i>et al.</i> , 2024
Wound healing	Excision/incision rat model	Wound-closure time comparable to nitrofurazone standard	Viswanathan <i>et al.</i> , 2018
Reproductive (fertility-enhancing)	In vivo rat (male and female)	Improved sperm motility/count, testosterone, FSH; improved pregnancy outcomes	Arun <i>et al.</i> , 2014; Ukoh <i>et al.</i> , 2022
Reproductive (antifertility)	In vivo rat, methanolic extract	Decreased testosterone, FSH, LH; reduced sperm count and motility	Osuchukwu <i>et al.</i> , 2016

Nutritional and Proximate Composition

Proximate composition of *J. tanjorensis* leaves has been reported with substantial inter-study variability. One study reported moisture 81.62%, ash 0.98%, crude fat 4.90%, crude fibre 2.80%, protein 5.37%, and carbohydrate 4.33%, with mineral content magnesium 32.81, calcium 36.85, sodium 19.89, potassium 43.15, phosphorus 4.28, iron 9.95, and zinc 14.49 mg/100g, and vitamin content including vitamin C at 26.41 mg/100g. A separate study of leaf-stalk

material reported markedly different values, including carbohydrate 38.48%, ash 23.44%, vitamin C 51.78 mg/100g, and potassium 974.2 mg/100g, an approximately 22-fold higher potassium value than the leaf-only study, plausibly reflecting genuine plant-part differences (leaf versus leaf-stalk) as well as possible differences in soil, growing region, and analytical method. A third study reported vitamin A as the dominant vitamin at 48.215 mg/100g, with vitamin E undetected, a profile not directly comparable to the other

two studies because the first two did not measure vitamin A and E. This magnitude of inter-study variability in mineral and vitamin

content, considerably larger than typically expected from measurement error alone.

Table 6. Comparison of proximate, mineral, and vitamin composition of *J.atropha tanjorensis* reported across three independent studies, illustrating substantial inter-study variability plausibly attributable to plant part, growing region, and analytical method.

Nutrient / Mineral	Study A (leaf)	Study B (leaf-stalk)	Study C (leaf)
Moisture (%)	81.62	Not reported	Not reported
Carbohydrate (%)	4.33	38.48	Not reported
Ash (%)	0.98	23.44	Not reported
Potassium (mg/100g)	43.15	974.2	Not reported
Vitamin C (mg/100g)	26.41	51.78	0.0347 (aqueous extract)
Vitamin A (mg/100g)	Not reported	Not reported	48.215 (highest of all vitamins measured)

Ethnobotanical and Cultural Significance

J. tanjorensis carries an unusually large number of local names across Nigerian ethnic groups and informal registers, reflecting both its wide geographic distribution as a compound-fence and vegetable-garden plant and its strong lay reputation as a health-protective food. It is consumed as a vegetable in soups predominantly in southern Nigeria, with the leaves' mildly astringent, occasionally skin-irritating raw texture noted in lay and pharmacological sources alike. Traditional uses documented

across the literature include anaemia, diabetes, malaria, hypertension, toothache and gum swelling, constipation, stomach ache, and general debility, with anaemia management the most consistently and prominently cited traditional indication, directly underlying the plant's most common Nigerian name.

Table 7b summarizes these local names and their documented traditional uses.

Table 7b. Local names and documented traditional uses of *Jatropha tanjorensis* across Nigerian ethnic and linguistic registers, drawn from the ethnobotanical/traditional-use sources in Table 7.

Local Name	Language / Register	Documented Traditional Use(s)	Reference
Hospital too far	Nigerian Pidgin English	Anaemia (primary/naming use), diabetes, malaria, hypertension, general debility	Oladele et al., 2020
Iyana-Ipaja	Yoruba	Leafy-vegetable / general health use, southwestern Nigeria	Iwalewa et al., 2005
Ugu oyibo	Igbo	Leafy-vegetable / general health use, southeastern Nigeria	Iwalewa et al., 2005
Catholic vegetable; reverend father vegetable	English (informal, Nigeria-wide)	Vegetable/soup use; general health	Oladele et al., 2020
Chaya leaf; tree spinach; miracle leaf	English (informal, Nigeria-wide)	Vegetable/soup use; toothache and gum swelling, constipation, stomach ache	Oladele et al., 2020

Figure 5 summarizes the approximate geographic distribution of included sources by country of study or corresponding-author affiliation; the overwhelming concentration in Nigeria, alongside a

small taxonomic-origin cluster from India, mirrors the plant's biogeography as a hybrid of Indian origin now culturally and pharmacologically embedded in Nigeria.

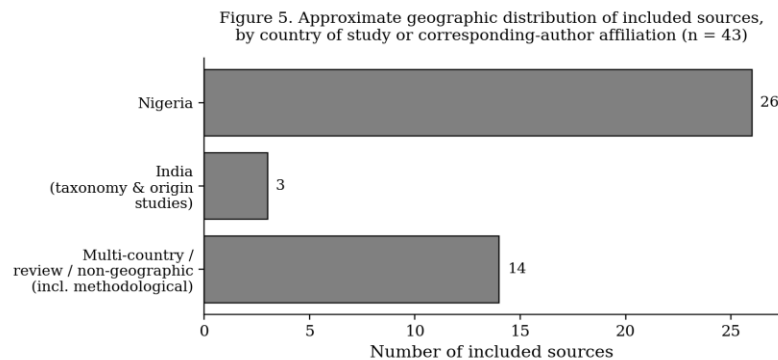


Figure 5: Approximate geographic distribution of included sources, by country of study or corresponding-author affiliation (n = 43).

Evidence hierarchy and study-type classification
Table 7 classifies the included sources by study-design type. This review identified no human clinical trials for *J. tanjorensis*, mirroring

the preclinical-only status observed for many similarly studied African medicinal and leafy-vegetable species.

Table 7. Evidence hierarchy and study-type classification of sources included in this scoping review. Counts sum to more than 43 in places because some sources span more than one category.

Study Type	Approx. n	Translational Relevance	Representative Refs.
Analytical/compositional chemistry (GC-MS, LC-MS/MS, proximate analysis)	9	High — directly descriptive of composition, subject to sampling/provenance limits	(Egbon <i>et al.</i> , 2013; Sabandar <i>et al.</i> , 2013; Nwachukwu, 2018; Babayemi <i>et al.</i> , 2021; Abubakar <i>et al.</i> , 2022; Bennett <i>et al.</i> , 2024; Yahaya <i>et al.</i> , 2026)
In vitro bioassay (antioxidant, antimicrobial, enzyme/docking)	10	Moderate-high for mechanism plausibility; not directly predictive of <i>in vivo</i> effect size	(Iwalewa <i>et al.</i> , 2005; Babayemi <i>et al.</i> , 2021; Umoren <i>et al.</i> , 2023b; Jumare <i>et al.</i> , 2024)
In vivo animal pharmacology/toxicology (rat/rabbit models)	17	Moderate — establishes plausible mechanism and dose-response in animals; requires caution extrapolating to humans	(Olayiwola <i>et al.</i> , 2004; Ehimwenma, 2009; Arun <i>et al.</i> , 2014; Idu <i>et al.</i> , 2014; Osuchukwu <i>et al.</i> , 2016; Oladele <i>et al.</i> , 2020; Umoren <i>et al.</i> , 2023a)
Taxonomic/agronomic characterization	3	High for the specific germplasm studied	(Ellis & Saroja, 1961; Prabakaran & Sujatha, 1999; Idu <i>et al.</i> , 2009)
Ethnobotanical / traditional-use documentation	4	High for the specific communities studied; qualitative	(Iwalewa <i>et al.</i> , 2005; Oladele <i>et al.</i> , 2020)
Methodological/analytical reference works (non-species-specific)	8	Foundational — underpins interpretation of assay results	(Bligh & Dyer, 1959; Ellman <i>et al.</i> , 1961; Singleton & Rossi, 1965; Ohkawa <i>et al.</i> , 1979; Marcocci <i>et al.</i> , 1994; Brand-Williams <i>et al.</i> , 1995; Benzie & Strain, 1996; Harborne, 1998; Re <i>et al.</i> , 1999; Zhishen <i>et al.</i> , 1999; Trease & Evans, 2002; AOAC International, 2005; Sofowora, 2008)
Human clinical studies	0	Not applicable — no human trials identified	—

Confidence Ratings by Evidence Theme

Table 8 presents narrative confidence ratings for each major evidence theme, following the approach described earlier.

Table 8: Narrative confidence ratings by evidence theme, following the judgement-based approach described in Section 2.8. These are not validated risk-of-bias scores.

Evidence Theme	Confidence Rating	Justification
Qualitative phytochemical class profile (flavonoids, tannins, saponins, terpenoids, steroids, cardiac glycosides)	High	Consistently replicated across independent studies and extraction methods
Alkaloid and anthraquinone presence/absence	Limited	Directly contradictory findings across studies
Antioxidant potency (DPPH and related assays)	Limited	Nearly four-fold variation in IC ₅₀ across the only two directly comparable studies located
Anti-anaemic / haematinic activity	Moderate	Majority of studies show consistent direction of effect, but at least one directly contradicts it
Hepatoprotective activity across toxicant models	Moderate-high	Consistent direction of effect across four independent hepatotoxicity models
Antimicrobial and antimalarial activity	Moderate	Replicated across studies, but assay conditions vary, and mechanisms are largely inferred rather than confirmed
Reproductive/hormonal effects (fertility-enhancing vs antifertility)	Limited	Directly contradictory findings across independent studies at broadly comparable doses
Nutritional/mineral composition specific values	Limited	Order-of-magnitude inter-study variability for several minerals and vitamins
Taxonomic origin as a <i>J. curcas</i> x <i>J. gossypifolia</i> hybrid	High	Confirmed by independent cytological and morphological lines of evidence
Human clinical efficacy or safety at any endpoint	Limited	No human clinical trials identified; all evidence is preclinical

Synthesis across Evidence: Convergence, Divergence, and Sources of Heterogeneity

This section reports patterns of agreement and disagreement directly observable across the included sources at the results stage, before interpretation; it also discusses the implications of these patterns. Several patterns of both convergence and divergence emerge when the included sources are compared directly. First, on core phytochemical class presence, there is reasonably strong convergence for flavonoids, tannins, saponins, terpenoids, steroids, and cardiac glycosides, but genuine disagreement on alkaloids and anthraquinones, which some studies report as present and others report as absent using ostensibly similar reagent-based screening methods. This suggests either genuine biological variability (e.g., soil, growing season, plant maturity) or methodological inconsistency in reagent application across laboratories; the included literature does not permit distinguishing between these explanations.

Secondly, and more strikingly, antioxidant potency values are not merely variable but span a magnitude difference inconsistent with a single underlying “true” value: a DPPH IC₅₀ of 49.7 µg/mL in one study and 185.02 µg/mL in another represent a nearly fourfold difference for ostensibly the same assay applied to the same plant part using methanolic extraction. Combined with the finding that *J. tanjorensis* performed as the weakest or among the weakest antioxidants when directly compared against eight other Nigerian edible vegetables in a single study, this review’s overall assessment is that *J. tanjorensis* should currently be regarded as a modest, inconsistently-quantified antioxidant source rather than

a potent one, a materially different characterization than the antioxidant claims found in lay sources about this plant.

Thirdly, the reproductive/hormonal literature contains a direct, unresolved contradiction: fertility-enhancing effects (increased testosterone, FSH, sperm quality) are reported in some studies, while antifertility effects (decreased testosterone, FSH, LH, sperm count and motility) are reported in others, at broadly overlapping dose ranges (100-650 mg/kg across the various studies) and using similar rodent models. Because the included studies differ in extract solvent (aqueous versus ethanolic versus methanolic), treatment duration (14 versus 28 days), and animal age (prepubertal versus adult), any of these factors could plausibly account for the divergent findings, but no included study varied only one of these factors while holding the others constant, so the review cannot adjudicate between competing explanations. This is arguably the most consequential unresolved contradiction identified in this review, given its direct relevance to a vegetable consumed by, among others, women of reproductive age.

Fourthly, the anti-anaemic literature, while predominantly consistent with the plant’s traditional reputation, is not unanimous: most studies report increased PCV, haemoglobin, and red blood cell counts, but at least one study in prepubertal male rats reports the opposite. Age (prepubertal versus adult) and extract type again differ between the concordant and discordant studies, offering a plausible but untested explanation.

Fifth, nutritional composition values vary by more than an order of

magnitude for some minerals (e.g., potassium reported at 43.15 mg/100g in one leaf study versus 974.2 mg/100g in a leaf-stalk study), a difference too large to attribute to measurement precision alone and more plausibly reflecting genuine differences in plant part, growing region, soil composition, or analytical method between studies, none of which is systematically documented or controlled for, across the nutritional literature as a whole.

DISCUSSION

Phytochemical Diversity in the Context of Hybrid Taxonomic Origin

J. tanjorensis's status as a natural interspecific hybrid between *J. curcas* and *J. gossypifolia* (Prabakaran & Sujatha, 1999) provides a useful lens for interpreting its phytochemical profile: the consistent presence of flavonoids, tannins, saponins, terpenoids, steroids, and cardiac glycosides is broadly consistent with the known phytochemistry of both parent species and the wider genus, as documented in genus-level reviews of *Jatropha* phytochemistry and pharmacology (Amaechi *et al.*, 2023). The inconsistent alkaloid and anthraquinone findings (Section 3.2) may reflect genuine hybrid-vigour-related variability in secondary metabolite expression, though this review found no study that directly investigated genotype-by-phytochemistry relationships in *J. tanjorensis*, this is an evidence gap.

Antioxidant Potency: A Materially Weaker and More Variable Profile than Lay Reputation Suggests

The antioxidant literature reviewed in Sections 3.4-3.5 supports a more cautious characterization of *J. tanjorensis*'s antioxidant potential than is typically conveyed in lay and promotional sources. DPPH IC₅₀ values of 49.7-185.0 µg/mL are one to two orders of magnitude weaker than the sub-10 µg/mL potency reported for

some other extensively studied Nigerian medicinal plant extracts in the wider literature, and *J. tanjorensis* was directly outperformed by several other commonly consumed Nigerian leafy vegetables in a head-to-head comparison. This does not mean *J. tanjorensis* lacks antioxidant activity, but it does suggest that antioxidant potency is unlikely to be the primary mechanistic driver of its most celebrated traditional use (anti-anaemic activity); we consider alternative mechanistic hypotheses.

Mechanistic Pathways Linking Phytochemicals to Bioactivity

Figure 4 summarizes a conceptual framework, synthesized from the compositional and pharmacological literature reviewed here, linking *J. tanjorensis*'s major phytochemical classes to plausible mechanisms and reported biological activities. The plant's iron, vitamin C, and B-vitamin content offers a nutritionally direct, and arguably more parsimonious, mechanistic route to anti-anaemic activity than an antioxidant-mediated pathway alone. Iron and vitamin C are direct substrates and co-factors for haemoglobin synthesis and erythropoiesis, independent of the plant's comparatively modest free-radical-scavenging capacity. The flavonoid and phenolic-acid fraction (chlorogenic acid, caffeic acid, ferulic acid, rutin) most probably underlies the hepatoprotective effects observed across the carbon-tetrachloride, sodium-benzoate, aspirin, and methotrexate hepatotoxicity models, which is consistent with the well-established hepatoprotective pharmacology of these compound classes in other plant systems. Saponin content plausibly underlies the antimicrobial activity observed against Gram-negative and Gram-positive clinical isolates. As with equivalent frameworks developed for other African medicinal plants, this synthesis presents probable, logically linked mechanisms drawn from the general pharmacology of these compound classes rather than mechanisms directly demonstrated in *J. tanjorensis*-specific studies.

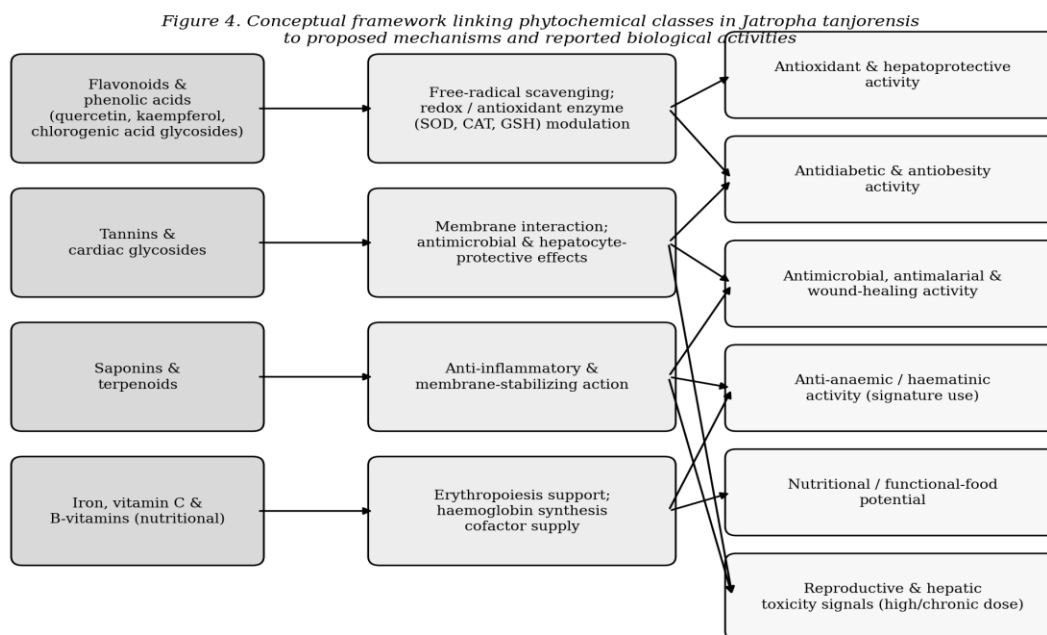


Figure 4. Conceptual framework linking phytochemical classes in *Jatropha tanjorensis* to proposed mechanisms and reported biological activities

The Contested Reproductive-Toxicology Literature: A Priority for Resolution

The direct contradiction identified earlier between fertility-enhancing and antifertility findings is, in this review's assessment, the single most important unresolved question in the *J. tanjorensis* literature, both because reproductive health outcomes carry direct consequences for a population that includes women of reproductive age and men trying to conceive, and because the studies in question are not readily reconciled by any single variable reported consistently across all of them. Responsible communication of *J. tanjorensis*'s reproductive effects, whether to consumers, traditional-medicine practitioners, or nutraceutical developers, should explicitly acknowledge this contradiction rather than selectively citing whichever direction of finding suits a particular framing.

Hepatoprotective and Antimicrobial Promise Versus Preclinical-only Status

The hepatoprotective findings across four independent toxicant models (carbon tetrachloride, sodium benzoate, aspirin, methotrexate) represent the most internally consistent pharmacological signal in the *J. tanjorensis* literature after the phytochemical class profile itself, and, combined with the antimicrobial findings against clinically relevant wound pathogens, represent the strongest current case for further pharmacological development. However, as with the anti-anaemic and reproductive findings, this evidence remains exclusively preclinical, a limitation that was discussed.

Human Versus Animal Evidence: Translational Caution

As Table 7 explicitly depicts, no human clinical trial of *J. tanjorensis* was identified in the course of this review. Every anti-anaemic, hepatoprotective, antidiabetic, antimicrobial, antimalarial, and reproductive finding summarized in Section 3 derives from rodent, rabbit, or *in vitro* models. This matters more, not less, for a plant that is already widely and informally consumed as a dietary vegetable by the Nigerian population, and by individuals self-treating anaemia or attempting to conceive, precisely the most directly implicated demography, by the contested reproductive-toxicology findings in Section 4.4. This review's central recommendation therein is that any communication of *J. tanjorensis*'s health effects should distinguish clearly between its long-standing, low-risk status as a leafy vegetable food and its unestablished status as a therapeutic agent for anaemia, diabetes, or fertility, for which rodent findings alone, particularly given the contradictions identified in this review, do not constitute sufficient evidence.

Nutritional and Functional-Food Potential

Despite the inter-study variability documented in Section 3.8, *J. tanjorensis*'s core nutritional profile (moderate protein, notable vitamin C and iron content, and a wide range of trace minerals) is broadly consistent with its role as a genuine dietary vegetable rather than merely a medicinal curiosity, paralleling numerous other African leafy vegetables studied for both nutritional and nutraceutical potential. The magnitude of inter-study variability, however, means any nutritional-labelling or functional-food claims should be based on standardized, geographically representative sampling rather than any single published dataset.

Ethnobotanical and Cultural Embeddedness

The sheer number of local names documented for *J. tanjorensis* across Nigerian ethnic and linguistic contexts is in itself informative about the plant's cultural reach, and the direct linguistic connection between its most common name (*hospital too far*) and its most consistently supported pharmacological finding (anti-anaemic activity) suggests that, unlike some ethnomedicinal claims that diverge substantially from what primary research supports, this particular traditional claim has a reasonably strong evidentiary basis, even if the underlying mechanism (nutritional iron/vitamin supply) may differ from the antioxidant-mediated mechanism sometimes assumed in the promotional literature.

Comparison with other *Jatropha* species and African Leafy Vegetables

Genus-level reviews of *Jatropha* phytochemistry and pharmacology document broadly similar compound classes (flavonoids, tannins, saponins, terpenoids, and in some species phorbol esters) across *J. curcas*, *J. gossypifolia*, *J. multifida*, and other congeners, with *J. curcas* in particular studied far more extensively than *J. tanjorensis*, including for biodiesel applications given its seed oil content, a use not relevant to *J. tanjorensis* given its lower seed-oil emphasis and primary use as a leaf vegetable (Amaechi *et al.*, 2023). India's *Jatropha* germplasm wealth, from which *J. tanjorensis* itself emerged as a natural hybrid, has separately been documented as a significant genetic resource for the wider genus (Ratha Krishnan & Paramathma, 2009), and GC-MS profiling of the related species *Jatropha maheswarii* provides a further comparative chemical reference point, reinforcing that inter-species chemical variation within the genus is the norm rather than the exception (Maria Sumathi & Uthayakumari, 2014). Comparative work situating *J. tanjorensis*'s nutritional and phytochemical profile directly alongside other commonly consumed Nigerian leafy vegetables found *J. tanjorensis* to be a comparatively weak antioxidant performer among this group, a useful corrective to any assumption that traditional prominence implies superior laboratory-measured bioactivity.

Regulatory Status and Commercialization Prospects

Unlike some crops with established food-ingredient regulatory histories, *J. tanjorensis* has no formal food-safety assessment like those available for some other African traditional foods; its safety basis rests primarily on long-standing informal dietary use without documented acute harm, rather than on any systematic toxicological review. Given the unresolved reproductive-toxicology contradiction, any move toward standardized nutraceutical or functional-food commercialization of *J. tanjorensis* extracts, as opposed to its existing status as a fresh leaf vegetable, should be preceded by dose-ranging reproductive and developmental toxicology studies specifically designed to test the hypotheses (solvent, duration, age) that might explain the current contradictory findings.

Implications for Consumers, Traditional-Medicine Practitioners, and Health Communicators

This synthesis yields three practical implications. First, *J. tanjorensis*'s status as a nutritionally reasonable leafy vegetable is better supported by the evidence than specific therapeutic claims (curing anaemia, treating diabetes, enhancing or reducing fertility), which should be communicated with the preclinical-only caveat established earlier. Second, given the genuine contradiction in the reproductive-toxicology literature, health communicators and

traditional-medicine practitioners should avoid making confident fertility-related claims in either direction until the discrepancy is resolved by controlled, variable-isolating research. Third, the large volume of lay-audience online content on this plant, encountered extensively but excluded from this review's evidence base, represents a communication gap that accurate, appropriately caveated public health messaging could usefully fill.

Gaps in the literature

Five gaps stand out. First, no study has resolved the reproductive/hormonal contradiction by systematically varying extract type, dose, treatment duration, and animal age while holding other factors constant. Secondly, the antioxidant-potency literature lacks standardized extraction and assay protocols, making the reported DPPH IC₅₀ values not meaningfully comparable across studies (Section 3.5). Thirdly, no study has directly tested whether *J. tanjorensis*'s phytochemical or nutritional profile varies systematically with genotype, growing region, or soil composition, despite the substantial inter-study variability documented, which would be consistent with such variation. Fourthly, no human clinical trial of any kind was identified (Section 4.6), leaving every pharmacological claim in a preclinical, hypothesis-generating state. Fifth, the mechanistic hypotheses summarized in Figure 4 have not been directly tested via receptor-binding, enzyme-kinetic, or knockout/knockdown studies; the sole exception is the molecular-docking evidence for an antiparasmodial mechanism, which remains an *in silico* prediction pending experimental confirmation.

Limitations of this Review

As a scoping review, this synthesis prioritized mapping breadth over formal methodological quality appraisal of individual studies. We did not log exact per-database search yields separately, a limitation relative to a fully auditable systematic or scoping review. A distinctive feature of this review is the unusually large volume of lay-audience online content on *J. tanjorensis* that we had to screen out actively. In contrast, this review is confident in the peer-reviewed provenance of its included sources; however, the aggressive exclusion of unverified-authorship sources may have excluded genuine but obscure primary research alongside the lay content it was intended to filter. The search prioritized English-language, peer-reviewed sources; institutional research from India, where the species originates, published in regional venues, or Nigerian institutional research not indexed in the databases consulted, may not be fully captured. Finally, the confidence ratings in Table 8 are transparent, judgement-based classifications rather than validated risk-of-bias scores.

Conclusion

J. tanjorensis, a natural interspecific hybrid between *J. curcas* and *J. gossypifolia* now naturalized and widely consumed as a leafy vegetable in Nigeria under the name *hospital too far*, presents a phytochemically active but evidentially heterogeneous profile. Its core phytochemical class profile (flavonoids, tannins, saponins, terpenoids, steroids, cardiac glycosides) is well replicated. Its signature anti-anaemic ethnomedicinal use has reasonable, though not unanimous, support, most plausibly via a nutritional iron/vitamin-supply mechanism rather than the antioxidant mechanism sometimes assumed, since its measured antioxidant potency is modest and highly variable relative to other studied Nigerian leafy vegetables. Multiple independent preclinical models

document hepatoprotective, antimicrobial, antimalarial, and wound-healing activities. Critically, however, the reproductive-toxicology literature contains a direct, unresolved contradiction between fertility-enhancing and antifertility findings that has direct relevance to a population that includes women of reproductive age, and every pharmacological finding in this review remains preclinical, with no human clinical trials identified. Future research resolving the reproductive-toxicology contradiction, standardizing antioxidant assay protocols, characterizing genotype-by-environment effects on composition, and undertaking the first human studies, per the numbered priorities, is needed before *J. tanjorensis*'s considerable traditional reputation can be translated into evidence-based, nutritional or therapeutic guidance.

Research Priorities

Based on the gaps identified earlier, the following research priorities are recommended, in approximate order of tractability:

1. Design a single, adequately powered reproductive-toxicology study that systematically varies extract solvent, dose, treatment duration, and animal age to identify which factor(s) explain the current contradiction between fertility-enhancing and antifertility findings.
2. Adopt and report a standardized DPPH (or equivalent) antioxidant assay protocol across future *J. tanjorensis* studies, explicitly stating extraction solvent, extract concentration range, and reference standard, to enable genuine cross-study comparison.
3. Conduct multi-site sampling of *J. tanjorensis* leaves across different Nigerian growing regions and soil types, paired with standardized phytochemical and nutritional analysis, to test whether the current inter-study variability reflects genuine geographic/genotypic variation or methodological inconsistency.
4. Conduct the first human studies of *J. tanjorensis*, beginning with a dietary-intake and iron-status observational study in habitual consumers before any interventional efficacy trial is attempted.
5. Experimentally test the mechanistic hypotheses summarized in Figure 4, particularly the proposed nutritional (iron/vitamin C-mediated) versus antioxidant-mediated pathways for anti-anaemic activity, and confirm the molecular-docking-predicted antiparasmodial targets through *in vitro* receptor-binding assays.
6. Characterize genotype-by-environment effects on *J. tanjorensis* phytochemistry using standardized germplasm from known taxonomic/hybrid lineages, building on the confirmed *J. curcas* x *J. gossypifolia* hybrid origin established in Section 3.1.
7. Develop and apply a systematic framework, such as AACODS, for evaluating the substantial volume of non-peer-reviewed online content on this plant, given its evident public reach and the risk of unverified health claims circulating without correction.

8. Any future systematic or scoping review building on this work should employ dual independent screening, a logged and database-audited search strategy, and a validated risk-of-bias instrument appropriate to the included study designs.

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Declarations

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Competing interests

The author(s) declare no competing interests.

Ethics approval and consent to participate

Not applicable. This scoping review synthesizes previously published, publicly available literature and did not involve human participants, human data, or animal experimentation conducted by the authors.

Consent to publish

Not applicable.

Data availability

As a scoping review of previously published literature, all data synthesized in this review are available in the cited primary sources.

Author contributions and reproducibility note

B.O. Oyeyinka, D.U. Okwor, E.J. Onyebueke, M.A. Alimi, S.O. Abdulrasaq, and O.P. Metu conceived and drafted this review.

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