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REVIEW

Malaria Research Output in Malaysia from 1956 to 2024: A Scientometric Analysis

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ABSTRACT

Malaysia has contributed to malaria research, particularly studies of *Plasmodium knowlesi* as a zoonotic cause of human malaria. This study mapped the growth, contributors, collaboration patterns, citation structure, journal concentration, author productivity, and thematic profile of Malaysia malaria research, addressing the absence of a national scientometric synthesis. We analysed 674 malaria-related publications indexed in Scopus from 1956 through 2024. Descriptive statistics, the Ajiferuke collaboration coefficient, citation analysis, Lotka, Bradford and Zipf models, and VOSviewer network mapping were applied. The valid-case denominators were 672 publications for authorship and collaboration and 673 for citation distribution. Output increased after the late 2000s and peaked at 37 publications in 2022. The collaboration coefficient was 0.70 and rose across the three study periods (0.47, 0.59 and 0.73). Of 2,041 authors, 78.05% published one article. The fitted Lotka exponent was 1.6722, and the cumulative-distribution distance was 0.2852. The BK Sen approximation had a lower error (6.37% versus 50.22%). Six journals formed the Bradford core; keyword frequencies were concentrated in a small set of terms. Malaysian malaria research expanded and developed international links, with citations concentrated in zoonotic-malaria studies. The findings support broader institutional participation and targeted research on ecological, environmental and socio-behavioural dimensions of zoonotic transmission.

Keywords: Malaria, Plasmodium, bibliometric, Bradford's Law, Lotka's Law, Scientometric analysis, Zipf's Law

Introduction

Malaria, caused by parasites of the genus *Plasmodium*, remains a major global health concern, particularly in tropical and subtropical regions (World Health Organization, 2025a). Malaysia recorded 243,870 notified malaria cases in 1961, at the start of the national eradication era (Ooi et al., 2023). This historical total predates contemporary surveillance categories and should not be interpreted as a count limited to indigenous, imported or zoonotic infections. Control measures subsequently reduced the national burden substantially, including to approximately 7,000 cases by 2008 (Ministry of Health Malaysia, 2010; Ali et al., 2023). More recently, the epidemiological profile has shifted: indigenous human malaria has been interrupted, while zoonotic *Plasmodium knowlesi* and imported infections remain operational concerns (Hussin et al., 2020; Ooi et al., 2023). Foundational Malaysian studies established *P. knowlesi* as an important cause of human malaria and documented its

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clinical severity, geographic distribution, vector ecology and diagnostic challenges (Singh et al., 2004; Cox-Singh et al., 2008; Vythilingam et al., 2008; Daneshvar et al., 2009; William et al., 2014; Rahim et al., 2020; Phang et al., 2020).

Bibliometric analysis provides a reproducible framework for describing scientific output, contributor concentration, collaboration, citation patterns and thematic development (Donthu et al., 2021; Passas, 2024). Previous malaria bibliometric studies have focused on Latin America (Munoz-Urbano et al., 2014), China (Du et al., 2021), India (Singh & Mahanty, 2019), artemisinin (Dong et al., 2022) or malaria vaccines (Garg et al., 2009), but no longitudinal national synthesis has integrated performance indicators, classical bibliometric laws and science mapping for Malaysia. Such mapping is important because Malaysia's transition from human-malaria control to a predominantly zoonotic-malaria research context may have altered the field's contributors, international linkages and thematic balance. This study therefore aimed to: (1) quantify publication and citation growth; (2) identify leading authors, journals and international partners; (3) assess collaboration, author productivity and journal/keyword concentration; and (4) identify thematic strengths and comparatively under-represented areas relevant to elimination and One Health research.

Materials and Methods

Data source and search strategy

A Scopus search was conducted on 26 May 2025. Eligible documents were English-language journal articles and reviews concerning malaria and Malaysia. The query allowed publication years from 1948 through 2024; the earliest retained record was published in 1956. Publications dated January–May 2025 were excluded to avoid partial-year bias. The exact search query was:

(TITLE-ABS-KEY(malaria) OR TITLE-ABS-KEY(*plasmodium*) OR TITLE-ABS-KEY("marsh fever") OR TITLE-ABS-KEY(paludism) OR TITLE-ABS-KEY("remittent fever")) AND (TITLE-ABS-KEY(malaya) OR TITLE-ABS-KEY(malaysia)) AND PUBYEAR > 1947 AND PUBYEAR < 2025 AND LIMIT-TO(EXACTKEYWORD, "Malaysia") AND (LIMIT-TO(DOCTYPE, "ar") OR LIMIT-TO(DOCTYPE, "re")) AND LIMIT-TO(LANGUAGE, "English")

Scopus was selected as the sole database because it provides broad multidisciplinary and Asian-journal coverage together with standardized citation, affiliation and author-identifier metadata suitable for reproducible bibliometric export (Baas et al., 2020). Using one curated source also avoids cross-database duplication and incompatible citation counts. Nevertheless, Scopus-only coverage may omit records indexed exclusively in Web of Science, PubMed/MEDLINE or local databases.

Record selection and data preparation

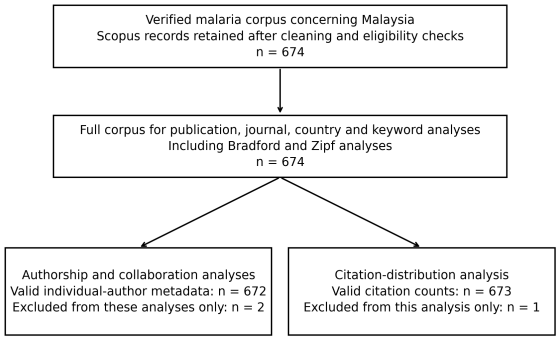


Figure 1. Analytic flow of the verified corpus and analysis-specific valid-case denominators.

Two researchers independently cleaned the export, removed duplicates using DOI, title and Scopus EID, and verified eligibility and essential metadata. The verified full corpus contained 674 records (**Figure 1**). Two records without usable individual-author metadata were excluded only from authorship and collaboration calculations (n = 672), and one record without a usable citation count was excluded only from the citation-frequency analysis (n = 673); publication, journal, country and keyword analyses used the full 674-record corpus. Author disambiguation used Scopus Author ID wherever available, followed by names, affiliations, collaboration patterns and publication chronology. Variants such as 'Lau, Yee Ling'/'Lau, Yee-Ling' and 'Singh, Balbir'/'Singh, B.' were treated as the same identities in tabulated counts. Disagreements were resolved by consensus.

Bibliometric measures and statistical criteria

Publication, author, journal, country and citation counts were summarized descriptively. Publication growth was examined using annual counts and a five-year moving average. The endpoint-based growth statistic reported by bibliometrix was retained as a descriptive summary (Aria & Cuccurullo, 2017); it was not assigned a confidence interval or significance test. Author rankings were based on publication counts, with Scopus h-index used to resolve ties. Percentages in **Table 2** used the full 674-record corpus as the denominator.

The Ajiferuke collaboration coefficient was calculated using the 672 publications with valid individual-author metadata (Ajiferuke et al., 1988):

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$$CC = 1 - \frac{\sum_{j=1}^{J} \frac{f_j}{j}}{N}$$

Here, f_j is the number of publications with j authors, J is the maximum team size and N is the valid publication count. Calculations used unrounded reciprocal weights. The same procedure was applied within each of the three study periods. No universal qualitative cutoff was imposed on CC values.

The endpoint-based growth summary was calculated as:

$$Growth\,(\%) = 100 \times \left[\left(\frac{P_{last}}{P_{first}}\right)^{1/q} - 1\right]$$

Pfirst and Plast are the publication counts in the first and last observed publication years; q denotes the number of observed publication years used in the reported bibliometrix summary. This statistic is sensitive to endpoints and should not be interpreted as a fitted annual trend.

For author productivity, y_x was the number of authors with x publications. The fitted Lotka exponent was the negative ordinary least-squares slope of $\log_{10}(y_x)$ against $\log_{10}(x)$, using all nonzero productivity classes (Lotka, 1926). The discrete theoretical proportions were normalized over every integer from 1 to the observed maximum, M:

$$p(x) = \frac{x^{-n}}{\sum_{u=1}^{M} u^{-n}},\ x = 1, \ldots, M$$

Observed proportions were y_x divided by the total number of authors. The absolute cumulative-distribution distance was:

$$D = max_{1 \le x \le M} |F_{obs}(x) - F_{model}(x)|$$

The conventional 5% benchmark, 1.36 divided by the square root of the author count, applies to the classical continuous, fully specified KS test. Here, productivity was discrete and the exponent was estimated from the same data. We therefore reported the distance descriptively and did not use that benchmark to claim statistical rejection; a valid inferential test would require appropriate simulation calibration (National Institute of Standards and Technology, n.d.).

A two-point exponent was also calculated from the single- and two-publication author frequencies, following the alternative approximation discussed by Sen et al. (1996):

$$n_{BK} = \frac{log(y_1/y_2)}{log(2)}$$

For the frequency comparison, both approximations used y_1 divided by x raised to the relevant exponent. Predicted author counts were rounded to the nearest integer. Percentage error was 100 times the sum of absolute predicted-minus-observed differences, divided by the total author count, evaluated over the nonzero observed productivity classes. This frequency approximation was kept separate from the normalized probability distribution used for the cumulative-distance calculation.

For Bradford analysis, journals were ordered by publication count and grouped into three zones containing approximately equal publication shares (Bradford, 1985). If their journal counts were J_1, J_2 and J_3, the geometric mean of the successive ratios defined the multiplier:

$$k = [(J_2/J_1) \times (J_3/J_2)]^{1/2};$$
$$T = J_1(1 + k + k^2)$$

The journal-total percentage error was 100 times the absolute difference between theoretical total T and observed total $J_1 + J_2 + J_3$, divided by the observed total. Successive zone ratios were also reported because a small total error does not demonstrate that individual zones fit the model.

Author-keyword frequencies were ordered from highest to lowest for descriptive Zipf rank-frequency analysis. The relationship was assessed visually; no fitted Zipf exponent or formal goodness-of-fit test was reported.

Figure 1 shows the verified corpus and the valid-case denominators for each analysis. The initial retrieval count and intermediate screening totals were not documented; the figure therefore begins with the verified corpus and does not reconstruct the complete identification and screening process.

Visualization and network mapping

VOSviewer version 1.6.18 was used for the country-collaboration and keyword co-occurrence analyses. Node size represents publication or occurrence frequency, links represent collaboration or co-occurrence, and colours represent VOSviewer clusters. Fractional counting was used for multi-authored publications.

Ethics statement

Ethical approval was not required because the study analysed publicly available bibliographic metadata.

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Results

Publication output and citation distribution

The full corpus comprised 674 malaria-related publications concerning Malaysia from 1956 through 2024 (**Figure 1**). Output was limited in the early decades and increased after the late 2000s. The raw annual count peaked at 37 publications in 2022. The descriptive endpoint-based growth statistic was 11.88%. **Figure 2** displays the five-year moving average, whose maximum was approximately 32 publications around 2021.

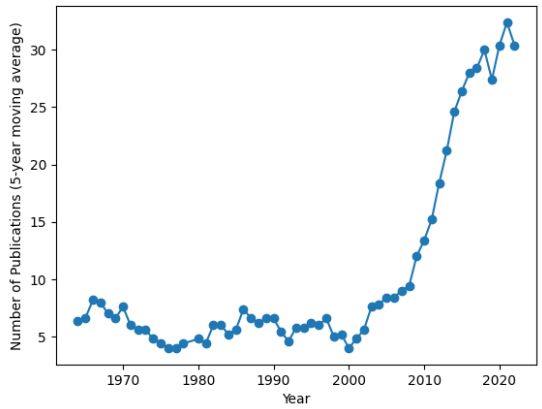


Figure 2. Five-year moving average of annual malaria publication counts in Malaysia from 1956 to 2024. The smoothed series peaks at approximately 32 publications around 2021; the raw annual maximum was 37 publications in 2022.

Citation counts were available for 673 records. Fifty publications had no citations, and the maximum was 620 citations (**Figure 3**). Seven of the ten most-cited publications concerned *Plasmodium knowlesi* (**Table 3**). This concentration describes the most-cited subset of the retrieved literature; it does not establish research quality, field-wide priority or consensus.

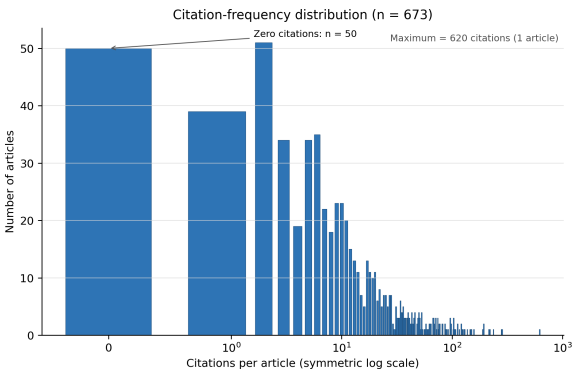


Figure 3. Citation-frequency distribution for 673 articles with valid citation counts. The symmetric logarithmic x-axis displays the strongly right-skewed distribution without treating citation counts as evenly spaced categories.

Authorship and collaboration

The overall collaboration coefficient was 0.70 among the 672 publications with valid individual-author metadata (**Table 1**). Period-specific coefficients were 0.47 for 1956–1979, 0.59 for 1980–2002 and 0.73 for 2003–2024 (Figure 4). Lau Yee Ling was the most prolific author, with 62 publications (9.20% of the full corpus), followed by Timothy William with 61 (9.05%) (**Table 2**).

Table 1. Authorship distribution for collaboration analysis of Malaysian malaria publications from 1956 to 2024

Number of authors per paper (x)	Number of papers with x authors (y)	Coefficient (1/x)	y × (1/x)
1	73	1.0000	73.00
2	59	0.5000	29.50
3	89	0.3333	29.67
4	96	0.2500	24.00
5	71	0.2000	14.20
6	64	0.1667	10.67
7	38	0.1429	5.43
8	43	0.1250	5.38
9	30	0.1111	3.33
10	29	0.1000	2.90
11	22	0.0909	2.00
12	14	0.0833	1.17
13	12	0.0769	0.92
14	8	0.0714	0.57
15	6	0.0667	0.40
16	3	0.0625	0.19
17	5	0.0588	0.29
20	4	0.0500	0.20
21	2	0.0476	0.10
26	2	0.0385	0.08
32	1	0.0312	0.03
45	1	0.0222	0.02
Total	672		204.04

Notes: The denominator was 672 publications with valid individual-author metadata. Two records were excluded from this analysis only. Reciprocal weights are displayed to four decimal places; totals were calculated from unrounded values. The overall collaboration coefficient was 0.70.

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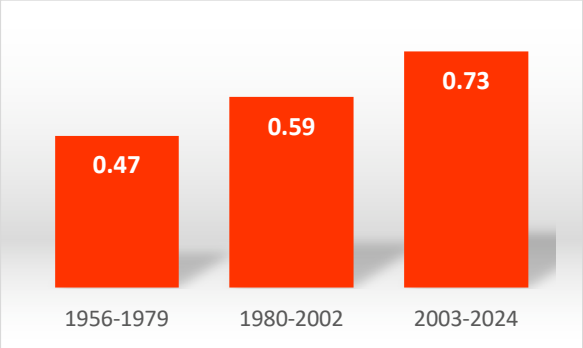


Figure 4. Collaboration coefficient across three time periods (1956-1979, 1980-2002 and 2003-2024).

The author-productivity analysis included 2,041 authors; 1,593 (78.05%) contributed one publication. The fitted Lotka exponent was 1.6722. The maximum absolute distance between the observed and normalized theoretical cumulative distributions was 0.2852, occurring at one publication per author. The rounded frequency approximation based on the BK Sen exponent had a lower percentage error (6.37%) than the fitted Lotka approximation (50.22%) (Supplementary Tables 1–3).

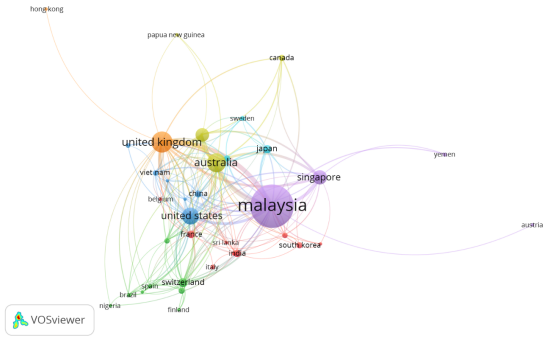


Figure 5. Country collaboration network for malaria research involving Malaysia.

The country-collaboration network showed Malaysia as the largest and most connected node. Prominent links involved Australia, the United Kingdom, the United States, Singapore, Japan and South Korea (**Figure 5**). The visualization reports network prominence and connection patterns; it does not by itself establish causal influence or leadership.

Journal concentration and thematic structure

The 674 publications appeared in 196 journals. Six core journals accounted for approximately one-third of publications, with Malaria Journal contributing 75 (11.1%). The three zones contained 6, 23 and 167 journals. Their successive journal-count ratios were 3.83 and 7.26, indicating an uneven zone progression. The geometric-mean multiplier was 5.28; the corresponding theoretical journal total differed from the observed total by 4.42% (**Table 4**).

Keyword frequencies were concentrated in a small group of frequently occurring terms, followed by a long tail of infrequent terms (**Figure 6**). This pattern was consistent with a descriptive Zipf rank-frequency relationship, although no fitted exponent or formal goodness-of-fit result was available.

Table 4. Distribution of journals across Bradford zones

Bradford Zone	Description	Number of Journals	Cumulative Journals
Zone 1	Core journals	6	6
Zone 2	Related journals	23	29
Zone 3	Peripheral journals	167	196

Notes: The zones contained approximately equal publication shares. Successive journal-count ratios were 3.83 and 7.26. The geometric-mean multiplier was 5.28; the theoretical total was 204.65 journals compared with 196 observed journals, giving a journal-total error of 4.42%. Calculation procedures are specified in Methods.

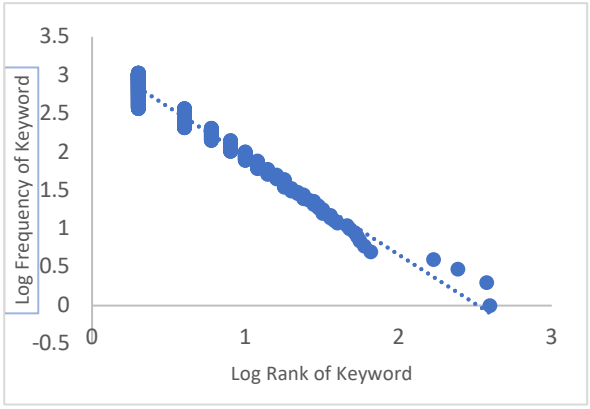


Figure 6. Zipf rank-frequency plot of author keywords in Malaysian malaria publications, 1956-2024. Compatibility with a rank-frequency pattern is descriptive and does not establish field maturity or consensus.

The keyword co-occurrence map showed four broad clusters: epidemiology and clinical impact; mosquito and primate transmission; treatment and drug response; and molecular and genetic studies (**Figure 7**). 'Malaysia' was one of the largest nodes because it was required by the search strategy, so its prominence does not identify an emerging theme.

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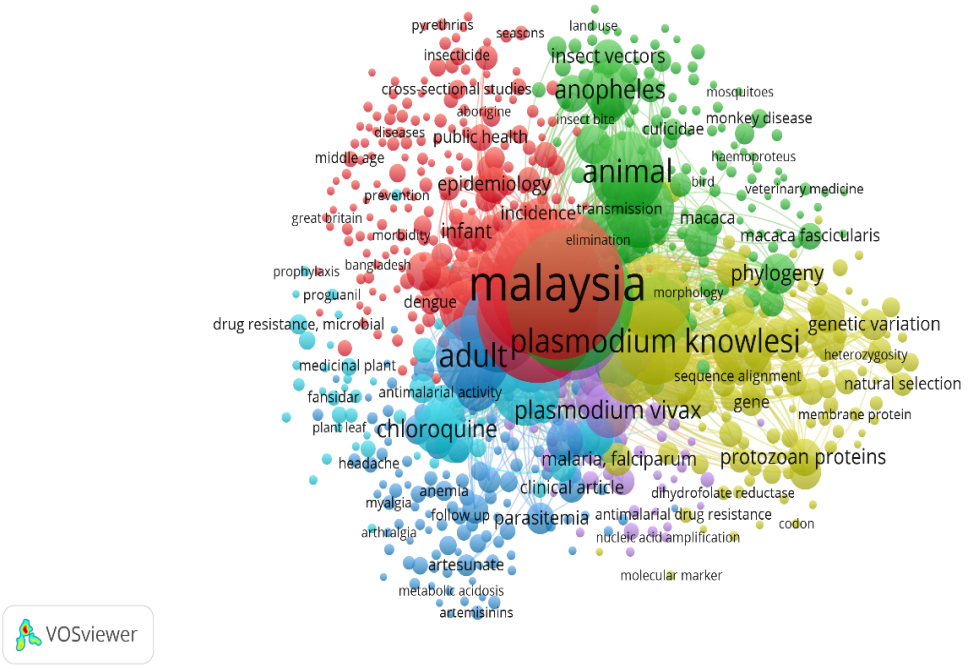


Figure 7. Keyword co-occurrence network of malaria research in Malaysia. Node size represents occurrence frequency, links represent co-occurrence and colours identify clusters. 'Malaysia' was a required search term, so its node size should not be interpreted as an emerging research theme.

Table 2. Ten most prolific authors of malaria research concerning Malaysia from 1956 to 2024

Rank	Author	Affiliation	Articles (n)	% of corpus	H-index
1	Lau, Yee Ling	Department of Parasitology, Faculty of Medicine, Universiti Malaya, Kuala Lumpur, Malaysia	62	9.20%	37
2	William, Timothy	Clinical Research Centre, Queen Elizabeth Hospital, Sabah, Malaysia; Infectious Diseases Society Sabah-Menzies School of Health Research Clinical Research Unit, Kota Kinabalu, Sabah, Malaysia	61	9.05%	41
3	Grigg, Matthew J.	Global and Tropical Health Division, Menzies School of Health Research, Charles Darwin University, Darwin, Australia	52	7.72%	35
4	Anstey, Nicholas M.	Global and Tropical Health Division, Menzies School of Health Research, Charles Darwin University, Darwin, Australia	51	7.57%	80
5	Barber, Bridget E.	Infectious Diseases Department, Royal Brisbane and Women's Hospital, Brisbane, Australia	44	6.53%	32
6	Fong, Mun Yik	Department of Parasitology, Faculty of Medicine, Universiti Malaya, Kuala Lumpur, Malaysia	42	6.23%	28
7	Singh, Balbir	Malaria Research Centre, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kuching, Sarawak, Malaysia	35	5.19%	43
8	Vythilingam, Indra	Department of Parasitology, Faculty of Medicine, Universiti Malaya, Kuala Lumpur, Malaysia	35	5.19%	35
9	Yeo, Tsin Wen	Communicable Diseases Centre, Institute of Infectious Disease and Epidemiology, Tan Tock Seng Hospital, Singapore	34	5.04%	47
10	Jelip, Jenarun	Sabah Department of Health, Kota Kinabalu, Sabah, Malaysia	34	5.04%	19

Notes:
a Percentages are calculated from the full corpus of 674 publications.
b Authors were ranked by publication count, with Scopus h-index used to break ties.

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Table 3. Ten most-cited malaria publications concerning Malaysia from 1956 to 2024

Rank	Article Title	Year	Journal	Citations
1	*Plasmodium knowlesi* malaria in humans is widely distributed and potentially life-threatening	2008	*Clinical Infectious Diseases*	620
2	Clinical and laboratory features of human *Plasmodium knowlesi* infection	2009	*Clinical Infectious Diseases*	284
3	Platelet accumulation in brain microvessels in fatal pediatric cerebral malaria	2003	*Journal of Infectious Diseases*	280
4	A naturally acquired quotidian-type malaria in man transferable to monkeys	1965	*Science*	236
5	First case of a naturally acquired human infection with *Plasmodium cynomolgi*	2014	*Malaria Journal*	220
6	A prospective comparative study of Knowlesi, falciparum, and vivax malaria in Sabah, Malaysia: High proportion with severe disease from *Plasmodium knowlesi* and *Plasmodium vivax*, but no mortality with early referral and artesunate therapy	2013	*Clinical Infectious Diseases*	215
7	Antimalarial activity of extracts of Malaysian medicinal plants	1999	*Journal of Ethnopharmacology*	193
8	Knowlesi malaria: newly emergent and of public health importance?	2008	*Trends in Parasitology*	193
9	Severe *Plasmodium knowlesi* malaria in a tertiary care hospital, Sabah, Malaysia	2011	*Emerging Infectious Diseases*	190
10	*Plasmodium knowlesi* in humans, macaques and mosquitoes in peninsular Malaysia	2008	*Parasites & Vectors*	189

Notes:
a Seven of the ten most-cited works concern *Plasmodium knowlesi*, indicating citation concentration within this top-cited subset rather than field-wide priority or consensus.
[b] Citation counts are based on the Scopus database.

Discussion

Long-Term Growth and Scientific Turning Points

Publication output increased after 2008, temporally coinciding with intensified clinical and epidemiological attention to human *Plasmodium knowlesi* following foundational reports (Singh et al., 2004; Cox-Singh et al., 2008). This temporal correspondence is not evidence that the discovery caused the publication increase. Changes in surveillance priorities, funding, institutional capacity, diagnostic methods and international collaboration may also have contributed.

Accordingly, the trajectory should be interpreted as an observed change in publication activity during a period of major epidemiological and scientific developments, rather than as proof of a single causal turning point. The scientometric design did not measure funding, workforce or institutional-policy changes directly.

Author productivity and knowledge concentration

Author productivity was highly skewed: 78.05% of authors contributed one publication. The fitted Lotka exponent was 1.6722, and the cumulative-distribution distance of 0.2852 showed a substantial descriptive discrepancy from the normalized model. Because productivity is discrete and the exponent was estimated from the same data, this distance was not interpreted as a formal significance test. These concentration patterns do not identify the organizational mechanisms that produced them.

One plausible, but untested, explanation is that research on *Plasmodium knowlesi* often combines specialized clinical diagnosis, molecular confirmation, vector or reservoir studies and access to geographically specific field sites (Singh et al., 2004; Cox-Singh et al., 2008; Vythilingam et al., 2008). Such requirements may favour established multidisciplinary teams. Because infrastructure, funding and field access were not measured, this explanation is presented as a hypothesis rather than a finding; claims about restricted innovation, succession or sustainability cannot be inferred from author counts alone.

The BK Sen approximation had a lower percentage error than the fitted Lotka approximation (6.37% versus 50.22%). This comparison was restricted to the observed productivity classes and rounded predicted frequencies. It does not establish external model validity or field maturation.

Collaboration Patterns and Multidisciplinary Engagement

The overall CC was 0.70, and the period-specific values rose from 0.47 to 0.59 and 0.73. This pattern is consistent with increasing co-authorship and

multidisciplinary engagement over time. It does not, without additional longitudinal organizational evidence, demonstrate 'structural maturation'. Collaboration can support productivity and knowledge exchange, but its effects vary by team composition and context (Lee & Bozeman, 2005).

Journal Distribution and Scholarly Communication

Bradford analysis identified a small journal core alongside a much larger peripheral set. Malaria Journal was the most frequent outlet in the retrieved corpus. The unequal successive zone ratios and the 4.42% discrepancy in the theoretical journal total show that the empirical pattern is not an exact Bradford progression.

Publication across malaria, tropical-medicine, public-health and biomedical journals demonstrates outlet diversity. Journal distribution alone, however, does not establish the maturity of the field or the policy impact of its publications.

Citation Distribution and Intellectual Influence

Seven of the ten most-cited publications concerned *Plasmodium knowlesi* (**Table 3**), showing the visibility of zoonotic-malaria studies within this subset. Citation counts depend on publication age and database coverage and do not directly measure clinical effectiveness or policy uptake.

The pattern nevertheless identifies a citation-dense knowledge base around zoonotic malaria. Less-cited topics should not automatically be labelled unimportant; instead, thematic gaps should be evaluated together with disease burden, elimination needs and stakeholder priorities.

International Collaboration and Global Positioning

Malaysia occupied a prominent position in the country-collaboration map, with visible links to Australia, the United Kingdom, the United States, Singapore, Japan and South Korea. These links document co-authorship connections, but the network visualization does not establish that collaboration caused higher impact or that Malaysia led every substantive area of malaria research.

The comparatively limited visibility of some malaria-endemic countries in the map suggests an opportunity for broader comparative partnerships. Such expansion may support context-sensitive evidence and capacity exchange, but this recommendation requires confirmation using country-normalized outputs and project-level data.

The keyword rank-frequency pattern showed a concentrated vocabulary, and co-occurrence mapping emphasized *Plasmodium knowlesi*, clinical and epidemiological terms, vectors, treatment and molecular methods. Compatibility with Zipf's Law is a descriptive property of word frequency; it is not evidence of conceptual maturity or consensus. The large 'Malaysia' node was structurally induced by the search query.

Within the author-keyword map, ecological, environmental and socio-behavioural terms were less visually prominent than clinical, epidemiological and molecular terms. Because keyword maps depend on author wording, indexing and thresholds, this is best treated as a signal for targeted evidence review rather than proof that these domains are absent. Nevertheless, the zoonotic transmission context makes these perspectives relevant to future One Health research.

Implications for Future Research

Future work should respond directly to the observed gaps by: (1) broadening participation beyond the small group of prolific authors and dominant affiliations represented among leading contributors; (2) strengthening partnerships with underrepresented malaria-endemic settings; and (3) evaluating ecological, land-use, vector-reservoir and socio-behavioural dimensions alongside clinical, diagnostic and molecular research. These priorities should be tested using content analysis, funding data and stakeholder-defined needs rather than inferred from bibliometric concentration alone.

Limitations

This study has several limitations. First, Scopus-only and English-language coverage may omit publications indexed exclusively in Web of Science, PubMed/MEDLINE, local databases or non-English sources; retrospective coverage may also be less complete for earlier decades. Second, 2025 publications were intentionally excluded to maintain complete calendar years. Third, citation counts, collaboration measures and network prominence do not measure research quality, causal influence, policy uptake or clinical impact and can vary with database, field and publication age. Fourth, the bibliometric laws are simplified descriptive models. The author-productivity distance was not calibrated by simulation for a discrete distribution with an estimated exponent, so no formal KS p-value is reported. The Bradford journal-total error does not test the accuracy of each zone, and the Zipf pattern was evaluated descriptively. Fifth, co-authorship omits informal collaboration and researcher mobility. Finally, keyword patterns depend on author terminology, indexer practices and mapping thresholds. The initial retrieval count before cleaning is

undocumented, limiting reconstruction of the complete record-selection flow. The annual growth statistic and network maps were available as summarized outputs; their underlying record-level calculations and mapping thresholds could not be independently reconstructed from the manuscript alone.

Conclusions

This analysis describes nearly seven decades of Malaysian malaria research using 674 Scopus-indexed publications. Output increased after the late 2000s, the collaboration coefficient was 0.70, and citation and keyword frequencies were concentrated. The observed author-productivity distribution differed descriptively from the fitted Lotka model; the BK Sen approximation had the lower percentage error under the specified comparison criterion. These findings describe the retrieved literature and should not be interpreted as evidence of field maturity, causal impact or consensus. Future research should broaden institutional and geographic participation and evaluate ecological, environmental, land-use and socio-behavioural dimensions of zoonotic malaria alongside clinical, diagnostic and molecular research to inform One Health approaches to elimination.

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Conflicts of interest statement

The authors declared no conflicts of interest.

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Data Availability statement

Data are available from the corresponding author upon reasonable request.

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