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Analysis of factors influencing contact dermatitis complaints among informal batik workers in Klaten Regency

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ABSTRACT

The batik industry within the informal sector, particularly in Jarum Village, Bayat District, Klaten Regency, presents a high risk of contact dermatitis complaints due to exposure to synthetic chemical dyes used in the coloring process. This study aims to analyze the factors associated with contact dermatitis complaints among informal batik workers, focusing on individual characteristics (age, gender, length of employment, duration of exposure, personal hygiene, and use of Personal Protective Equipment/PPE) and environmental factors (workplace temperature and humidity). A quantitative method with an analytical observational approach and cross-sectional design was employed. A total of 146 respondents were selected through purposive sampling. The results indicate that age, duration of chemical exposure, personal hygiene, and PPE use are significantly associated with contact dermatitis complaints. These findings underscore the importance of preventive interventions through adequate PPE provision, hygiene education, and community-based occupational health monitoring, particularly within the informal batik industry.

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INTRODUCTION

The informal sector remains the backbone of employment in Indonesia. According to the Central Bureau of Statistics, in February 2019 the labor force in Central Java reached 18.59 million people, with a Labor Force Participation Rate (LFPR) of 70.21%. Approximately 60.24% of this population is employed in the informal sector, which continues to grow (Badan Pusat Statistik Kabupaten Sragen, 2019). One of the regions that significantly contributes to this sector is Bayat District in Klaten Regency, which is renowned for its batik industry, particularly in Jarum Village (Porwani et al., 2023). This village is home to 20 batik industries, most of which utilize synthetic dyes, known for their efficiency, vibrant colors, and affordability, but which pose serious health risks, especially skin conditions such as contact dermatitis.

The process of batik production involving synthetic dyes contains chemical substances such as napthol, remazol, and indigosol that are classified as irritants. When exposed for extended periods, especially in the absence of adequate Personal Protective Equipment (PPE), Exposure to specific allergens or chemical irritants can lead to skin inflammation known as contact dermatitis (Hapis et al. 2023), (Mayasari et al. 2022). According to the Indonesian Ministry of Health (2018), the national prevalence of dermatitis is 6.8%, while Central Java exceeds this with a rate of 6.9%. These figures suggest that skin diseases, particularly occupational contact dermatitis (OCD), are public health concerns requiring greater attention, especially among informal workers who often lack access to occupational health protection (Sirait & Siregar, 2021).

Based on data from the Social Security Administration (BPJS Ketenagakerjaan), the number of occupational accident cases continues to rise, reaching 265,334 cases in 2022. Among occupational skin diseases, contact dermatitis accounts for 85–98% of cases, with an estimated incidence of 0.5 to 0.7 cases per 1,000 workers annually (BPJS, 2022) (Abastian 2024), (Ananda dan Handayani 2023). Occupational skin disorders are predominantly comprised of contact dermatitis, which constituted approximately 70% to 90% of all work-related disease cases reported globally, as indicated by the International Labour Organization (ILO) in 2019. This condition commonly affects areas of the body that are in direct contact with chemicals, such as hands and fingers, significantly impairing workers' productivity (DARMAWAN 2023), (Rachman 2025).

Previous studies have identified multiple determinants of contact dermatitis, both endogenous (age, gender, genetics, ethnicity, skin location, and atopy history) and exogenous (chemical properties, duration of exposure, environmental conditions such as temperature and humidity, and the use of irritant substances) (Septiana 2023), (Khairunnisa 2022). Additionally, personal hygiene practices and consistent use of PPE have been found to play a crucial role in reducing the risk of contact dermatitis. However, there is a notable lack of research specifically examining these contributing factors in the context of synthetic dye-based batik production in informal sector settings, particularly in Jarum Village (Coman et al., 2014).

The core issue addressed in this study is the high potential for contact dermatitis complaints among informal batik workers due to prolonged exposure to chemical dyes, while preventive efforts through promotive and protective measures remain suboptimal. According to Article 86(1) of Law No. 13 of 2003 on Manpower, workers are legally guaranteed the right to a safe and healthy working environment. This condition reveals a gap between the demands of productivity and the provision of adequate health protection for informal workers.

The objective of this study is to explore the determinants influencing complaints of contact dermatitis among informal batik workers residing in Jarum Village, Klaten Regency. It focuses on individual characteristics (age, gender, years of service, contact duration, personal hygiene, and PPE use) as well as environmental factors (workplace temperature and humidity). By applying a descriptive-analytic approach, This study is intended to offer a detailed examination of the variables that lead to contact dermatitis among informal batik artisans.

The innovative aspect of this research is centered on its distinct setting and subject—batik workers in a tourism-oriented village recognized for its use of synthetic dyes in batik production. Although many studies have addressed occupational contact dermatitis, few have explored multi-factor relationships in the context of small-scale synthetic dye batik industries in the informal sector. Thus, the outcomes of this research are anticipated to contribute as a useful resource for community-driven occupational health initiatives and support the formulation of protective regulations for workers in small and medium-sized enterprises (SMEs).

RESEARCH METHOD

This study employed a quantitative research design with an analytical observational approach and a cross-sectional framework, aiming to identify the relationship between independent variables such as personal hygiene, use of personal protective equipment (PPE), temperature, humidity, age,

gender, length of employment, and duration of exposure and the dependent variable, namely complaints of contact dermatitis among informal batik workers in Jarum Village, Klaten Regency. The research procedure was carried out in three main stages: pre-research (including literature review, preliminary observation, obtaining research permits, and proposal preparation), implementation (data collection through structured interviews, observation, and documentation), and post-research (data processing and analysis). The sample was selected using purposive sampling, with a total of 146 respondents determined using Slovin's formula from a population of 200 workers. Data collection instruments included questionnaires, observation checklists, and a thermo-hygrometer, all of which were tested for validity and reliability prior to use. Data were analyzed using SPSS software through stages of editing, coding, data entry, and tabulation. Descriptive statistics through univariate analysis were used to summarize variable distributions. Relationships between dependent and independent variables were assessed through chi-square-based bivariate analysis. Subsequently, multiple logistic regression was employed in the multivariate analysis to pinpoint the strongest predictors of contact dermatitis, with variable inclusion guided by bivariate p-values below 0.25 (Notoatmodjo, 2018; Sugiyono, 2018).

RESULTS AND DISCUSSIONS

The Relationship Between Respondents' Characteristics and Contact Dermatitis Complaints Among Informal Batik Workers in Jarum Village

Table 1. Relationship between respondents' characteristics and contact dermatitis complaints among informal batik workers in jarum village

Variable	Contact Dermatitis Complaints						
	Yes		No		*Total*		*P-Value*
	n	%	n	%	n	%	
Age							
>40 years	55	79,7	14	20,3	69	100	0,009
≤40 years	46	59,7	31	40,3	77	100	
Gender							
Female	85	68	99	32	125	100	0,452
Male	16	76,2	5	23,8	21	100	

The Chi-Square analysis in Table 1 reveals that age is not significantly associated with contact dermatitis complaints among informal batik workers in Jarum Village. Nonetheless, a significant correlation was identified between age and sex, supported by a p-value of 0.009 ($p < 0.05$).

a) Age, the analysis results show that respondents aged over 40 years have a higher proportion of contact dermatitis complaints (79.7%) compared to those aged 40 years and under (59.7%). The analysis produced a statistically significant result ($p = 0.009$), pointing to age as a relevant variable in the manifestation of contact dermatitis among workers in the informal batik industry. This underscores the influence of age on the likelihood of experiencing skin-related health complaints in Jarum Village, Klaten Regency.

This finding aligns with previous research conducted on batik workers in Surakarta, which also demonstrated a significant relationship between length of employment and incidence of irritant contact dermatitis ($p = 0.044$; OR = 5.14; 95% CI: 0.95–27.70) (Wijayanti & Sumardiyono, 2019). Another study conducted on informal batik workers at CV. Batik Temu Jodo in Pekalongan City also confirmed a relationship between age and contact dermatitis incidents (p-value = 0.043). The results showed that the prevalence of contact dermatitis was higher among respondents aged ≤37 years (31.0%) compared to those aged >37 years (28.0%) (Thoyiba & Rahma, 2025).

b) Sex, among the respondents, 85.6% were women and 14.4% were men. Based on the statistical analysis, the p-value obtained was 0.452 ($p > 0.05$), indicating no statistically meaningful

correlation between gender and the incidence of contact dermatitis. This suggests that, within the informal batik workforce in Jarum Village, gender does not have a significant effect on the likelihood of experiencing contact dermatitis.

This outcome supports previous studies which have reported that gender does not play a significant role in the incidence of irritant contact dermatitis. Similar findings have been reported in studies involving different occupational groups. Research on batik workers in Surakarta reported a p-value of 0.112 for the sex variable, indicating no significant difference in the incidence of irritant contact dermatitis between male and female workers in the "Mahkota" and "Merak Manis" batik industries (Wijayanti & Sumardiyono, 2019).

A multicenter study on traditional batik workers in Yogyakarta also did not include gender as a significant risk factor in the final model for occupational skin disease (OSD) in general; instead, risk levels were more influenced by daily work duration and type of work process (e.g., wet process), suggesting that occupational exposure plays a greater role than biological sex differences (Febriana et al., 2023).

The insignificance of sex as a variable is also supported by a study on garment workers in Beijing, where univariate analysis showed no difference in the prevalence of contact dermatitis between male and female workers (p = 0.71), whereas job type (sewing/ironing) and exposure to materials (e.g., leather, fur) were strongly associated with dermatitis (Chen et al., 2017).

The Relationship Between Length of Employment and Complaints of Contact Dermatitis Among Informal Batik Workers in Jarum Village

Table 2. Relationship between length of employment and contact dermatitis complaints among informal batik workers in jarum village

Length of Employment	Contact Dermatitis Complaints						
	Yes		No		*Total*		*P-Value*
	n	%	n	%	n	%	
Short-term	66	71	27	29	93	100	0,535
Long-term	35	66	18	23,8	53	100	

Table 2 displays the results of a Chi-Square test, which demonstrate that employment duration does not significantly affect the incidence of contact dermatitis among informal batik workers in Jarum Village.

The p-value obtained for the length of employment variable is 0.535 (p > 0.05), indicating no statistically significant relationship. The analysis results show that workers with longer employment durations have a higher proportion of contact dermatitis complaints (71%) compared to those with shorter employment durations (66%).

Previous studies have shown that length of employment is not significantly associated with the incidence of contact dermatitis among respondents. This finding aligns with a study conducted among traditional batik workers in Yogyakarta, where length of employment was not identified as a significant factor in the multivariate model after being controlled for other variables such as type of work process and daily exposure duration (p > 0.05) (Febriana et al., 2023).

Another study on synthetic color batik artisans in Giriloyo reported similar findings, where length of employment was not significantly associated with contact dermatitis complaints (p = 0.372), with dominant influencing factors being personal hygiene behavior and the use of personal protective equipment (Hasanah & Rifai, 2021). Additionally, research among batik workers in West Denpasar showed that years of employment did not significantly correlate with work-related contact dermatitis, although the frequency of daily contact with chemicals was found to be a meaningful variable (Efrilia et al., 2024).

The Relationship Between Duration of Contact and Complaints of Contact Dermatitis Among Informal Batik Workers in Jarum Village

Table 3. Relationship between duration of contact and contact dermatitis complaints among informal batik workers in jarum village

Duration of Contact	Contact Dermatitis Complaints						
	Yes		No		*Total*		*P-Value*
	n	%	n	%	n	%	
≥ 3 hours/day	90	73,8	32	26,2	122	100	0,007
< 3 hours/day	11	45,8	13	54,2	24	100	

Based on the results of the Chi-Square statistical test in Table 3, there is a significant relationship between duration of contact and complaints of contact dermatitis among informal batik workers in Jarum Village. The p-value for the duration of contact variable is 0.007 ($p < 0.05$), indicating a statistically significant relationship. The analysis shows that workers with contact duration of ≥3 hours/day had a higher proportion of contact dermatitis complaints (73.8%) compared to those with contact duration of <3 hours/day (45.8%).

Previous studies have indicated that the duration of daily chemical contact is significantly associated with the incidence of contact dermatitis. A study on 222 traditional batik workers in Yogyakarta reported that exposure for ≥4 hours per day significantly increased the risk of occupational skin diseases compared to exposure of <4 hours per day (Febriana et al., 2023). A similar study conducted on batik artisans in Giriloyo found that workers with chemical contact for more than 4 hours had a higher prevalence of contact dermatitis complaints compared to those with less than 4 hours of contact ($p < 0.05$) (Hasanah & Rifai, 2021). Furthermore, research among informal sector batik artisans at CV. Batik Temu Jodo in Pekalongan also supports these findings, where daily contact duration was one of the significant factors affecting contact dermatitis occurrence ($p < 0.05$) (Thoyiba & Rahma, 2025).

This finding is reinforced by research on laundry workers, which showed that frequency and duration of exposure to detergents and solvents for more than 3 hours per day significantly increased the risk of contact dermatitis ($p = 0.001$). A study on fish smoking workers in Demak also reported high levels of dermatitis complaints in wet and dirty work environments with continuous water exposure, where 40% of 80 workers surveyed reported dermatitis complaints accompanied by itching and skin redness (Setyaningsih et al., 2020). Research on textile workers in Beijing also found that longer daily exposure duration was significantly associated with an increased incidence of contact dermatitis, even after controlling for age, gender, and length of employment ($p < 0.05$) (Whitmore et al., 2019).

The Relationship Between Personal Hygiene Practices and Contact Dermatitis Complaints Among Informal Batik Workers in Jarum Village

Table 4. Relationship between personal hygiene and contact dermatitis complaints among informal batik workers in jarum village

Personal Hygiene	Contact Dermatitis Complaints						
	Yes		No		*Total*		*PValue*
	n	%	n	%	n	%	
Poor	95	81,9	21	20,5	116	100	0,0000000001
Good	6	20	24	80	30	100	

Table 4 presents the results of the Chi-Square test, which confirm a statistically significant link between personal hygiene and the incidence of contact dermatitis among informal batik workers in Jarum Village. With a p-value of 0.000000001 ($p < 0.05$), the association is highly significant. The data indicate that contact dermatitis was reported by 81.9% of respondents with inadequate hygiene, compared to only 20% among those who maintained good personal hygiene.

Previous research has demonstrated a significant association between personal hygiene and the incidence of contact dermatitis. A study conducted at the Giriloyo batik center found that workers with poor hygiene practices, such as rarely washing hands after chemical contact and not changing work clothes, were at higher risk of developing contact dermatitis (p = 0.028) (Hasanah & Rifai, 2021). Similar findings were reported by Tarigan, (2025) among conventional laundry workers in Siantar Martoba, where habits such as not using gloves and not washing hands after work were significantly associated with irritant contact dermatitis (p = 0.009) (Tarigan, 2025). An international study by Zhao & Lin (2020) on textile workers in Beijing also supports this finding, indicating that poor hygiene behaviors, such as infrequent changing of work clothes and not washing hands after exposure, increase the incidence of contact dermatitis even after controlling for other factors (p < 0.05) (Whitmore et al., 2019). These findings affirm the importance of good hygiene behavior, including proper hand washing, cleaning chemical residues from the skin, and regularly changing work clothes, in minimizing exposure to irritants that may trigger dermatitis.

The Relationship Between the Use of Personal Protective Equipment (PPE) and Contact Dermatitis Complaints Among Informal Batik Workers in Jarum Village

Table 5. Relationship between use of PPE and contact dermatitis complaints among informal batik workers in jarum village

	Contact Dermatitis						
Use of PPE	Yes		No		*Total*		*P-Value*
	n	%	n	%	n	%	
Incomplete	99	85,8	25	38,2	124	100	0,000000001
Complete	2	9,1	20	90,9	24	100	

According to the statistical findings presented in Table 5, a significant association exists between the utilization of personal protective equipment and the occurrence of contact dermatitis among informal batik workers in Jarum Village. The bivariate analysis reported a highly significant p-value of 0.000000001 (p < 0.05), establishing a strong link between PPE adherence and skin health outcomes. The multivariate regression analysis further supports this, with an Exp(B) value of 34.290, indicating that inadequate PPE use increases the risk of contact dermatitis by approximately 34 times compared to full and proper use.

Previous research has shown a significant association between PPE use and the incidence of contact dermatitis. A study conducted at the Giriloyo batik center reported that workers who did not consistently use PPE, particularly gloves during the dyeing process, had a higher risk of experiencing contact dermatitis (p = 0.002) (Hasanah & Rifai, 2021). This finding is supported by research on informal batik artisans in Pekalongan, which showed that non-compliance with PPE usage was associated with contact dermatitis incidence (p < 0.05) (Thoyiba & Rahma, 2025). Research on textile workers in Beijing reinforces this evidence, indicating that consistent PPE usage can reduce the incidence of dermatitis, even after controlling for contact duration and type of chemical exposure (p < 0.05) (Whitmore et al., 2019). This is also in line with a literature review by Yuliani Setyaningsih, which focused on PPE compliance among informal sector workers in Indonesia. Although not specifically focused on dermatitis, the low compliance with PPE use contributes to a higher risk of irritant/allergen exposure, especially among informal sector workers such as batik artisans (Laksono et al., 2024).

CONCLUSION

Based on the findings of the study, it can be concluded that several factors are significantly associated with contact dermatitis complaints among informal batik workers. Younger age, longer exposure to chemical substances, poor personal hygiene practices, and incomplete use of personal protective equipment were found to increase the risk of experiencing skin-related complaints. In

contrast, gender and length of employment showed no significant relationship, indicating that these variables are not dominant factors in the incidence of contact dermatitis. These results highlight the importance of work-related behavior and protective measures in preventing occupational skin disorders in informal work environments.

Given these findings, the study holds potential as a foundation for the development of more targeted prevention programs, such as regular education on hygiene practices and the provision of standard-compliant protective equipment. Moreover, the results open opportunities for further research with broader geographic coverage or longitudinal study designs to strengthen empirical evidence regarding causal relationships. Technology-based approaches, such as digital media for occupational health education, also present promising prospects for future application that are both relevant and sustainable for batik workers across various regions.

References

Abastian, Tiara Maharani Nur Hiliyatin Nisaa. 2024. "Analisis Risiko Kecelakaan Kerja Pada Pekerja Bagian Produksi PT. Semen Tonasa." Universitas Hasanuddin.

Ananda, Melyka Ayu, dan Wiwik Handayani. 2023. "Peningkatan Pemahaman Masyarakat terhadap Manfaat dari Program BPJS Ketenagakerjaan bagi Pekerja Bukan Penerima Upah (BPU) di Surabaya dan Sidoarjo." Jurnal Sosio Humaniora Sasanti 4 (3).jawa-tengah-februari-2019.html

Badan Pusat Statistik Kabupaten Sragen. (2019). Keadaan Ketenagakerjaan Provinsi Jawa Tengah Februari 2019. https://sragenkab.bps.go.id/id/pressrelease/2019/05/31/65/keadaan-ketenagakerjaan-provins

Chen, Y.-X., Cheng, H.-Y., & Li, L.-F. (2017). Prevalence and risk factors of contact dermatitis among clothing manufacturing employees in Beijing. *Medicine*, *96*(12), e6356. https://doi.org/10.1097/MD.0000000000006356

Coman, G., Blattner, C. M., Blickenstaff, N. R., Andersen, R., & Maibach, H. I. (2014). Textile allergic contact dermatitis: Current status. *Reviews on Environmental Health*, *29*(3), 163–168. https://doi.org/10.1515/reveh-2014-0061

DARMAWAN, FAJRI. 2023. "GAMBARAN KECELAKAAN KERJA PADA PEKERJA BAGIAN PRODUKSI DI PT. SICINI INTERNUSA KABUPATEN LAMPUNG TIMUR TAHUN 2023." POLTEKKES KEMENKES TANJUNGKARANG.

Efrilia, Luh Gede Pradnyawati, & Sayu Widyawati. (2024). Hubungan Riwayat Atopi dengan Kejadian Dermatitis Kontak Akibat Kerja Pekerja Batik di Denpasar BaratHubungan Riwayat Atopi dengan Kejadian Dermatitis Kontak Akibat Kerja Pekerja Batik di Denpasar Barat. *Aesculapius Medical Journal*, *4*(2), 287–292. https://doi.org/10.22225/amj.4.2.2024.287-292

Febriana, S. A., Erdina, Dewi, K., Ridora, Y., Anggraeni, A., Indrastuti, N., Waskito, F., Oginawati, K., Tanziha, I., & Prakoeswa, C. R. S. (2023). Risk factors of occupational skin diseases among traditional batik manufacturing workers in Yogyakarta, Indonesia. *BMC Research Notes*, *16*(1). https://doi.org/10.1186/s13104-022-06105-0

Hasanah, M., & Rifai, M. (2021). HUBUNGAN PERSONAL HYGIENE DAN PENGGUNAAN APD DENGAN KELUHAN DERMATITIS KONTAK PADA PEMBATIK WARNA SINTETIS DI GIRILOYO KABUPATEN BANTUL. *HEARTY*, *9*(1), Article 1. https://doi.org/10.32832/hearty.v9i1.4569

Hapis, Abul Ainin, Putri Sahara Harahap, Ahmad Husaini, Sugiarto Sugiarto, dan Fitriani Fitriani. 2023. "Dermatitis Kontak Akibat Kerja pada Pengrajin Batik di Kecamatan Pelayangan Kota Jambi." Jurnal Ilmiah Universitas Batanghari Jambi 23 (3): 3184–87.

Khairunnisa, Khairunnisa. 2022. "FAKTOR-FAKTOR YANG BEHUBUNGAN DENGAN KEJADIAN DERMATITIS KONTAK PADA PETANI RUMPUT LAUT DI WAETUWO KABUPATEN BONE TAHUN 2021= FACTORS ASSOSIATED WITH THE INCIDENCE OF CONTACT DERMATITIS IN SEAWEED FARMERS ON WAETUO BONE DISTRICT 2021." Universitas Hasanuddin.

Laksono, A. D., Setyaningsih, Y., & Lestyanto, D. (2024). Kepatuhan menggunakan alat pelindung diri (APD) di kalangan pekerja sektor informal di Indonesia: A literature review. *Holistik Jurnal Kesehatan*, *17*(10), Article 10. https://doi.org/10.33024/hjk.v17i10.13617

Mayasari, Reza, Soenarto Kartowigno, Nopriyati Nopriyati, dan Syarif Husin. 2022. "HUBUNGAN PEWARNA SINTETIS TERHADAP KEJADIAN DERMATITIS KONTAK OKUPASIONAL PADA PENGRAJIN KAIN JUMPUTAN PELANGI PALEMBANG." Media Dermato-Venereologica Indonesiana 49 (3): 145–51.

Porwani, S., Susanto, Y., Zubaidah, R. A., Purwanto, M. B., & Despita, D. (2023). Sosialisasi Dan Pelatihan Membatik Untuk Peningkatan Kapasitas Perempuan Di Kota Palembang. *Sejahtera: Jurnal Inspirasi Mengabdi Untuk Negeri*, *2*(2), Article 2. https://doi.org/10.58192/sejahtera.v2i2.702

Rachman, Erwinda Alwi. 2025. Dasar-Dasar Kesehatan Dan Keselamatan Kerja. Nas Media Pustaka.

Septiana, Novi Andika. 2023. "GAMBARAN FAKTOR PERSONAL HYGIENE DAN SANITASI LINGKUNGAN PENDERITA DERMATITIS KONTAK DI WILAYAH KERJA PUSKESMAS KENALI KABUPATEN LAMPUNG BARAT TAHUN 2023." POLTEKKES KEMENKES TANJUNGKARANG.

Setyaningsih, Y., Wahyuni, I., & Ekawati. (2020). Identification of Musculoskeletal Disorder Complaint, Dermatitis Incident and Respiratory Disorder in Smoked Fish Worker. *E3S Web of Conferences*, *202*, 12003. https://doi.org/10.1051/e3sconf/202020212003

SIRAIT, R. A., & SIREGAR, A. O. (2021). FAKTOR-FAKTOR YANG BERHUBUNGAN DENGAN KEJADIAN DERMATITIS PADA PEDAGANG IKAN DI PASAR TRADISIONAL KOTA KISARAN KABUPATEN ASAHAN. *Jurnal Keperawatan Dan Fisioterapi (JKF)*, *4*(1). https://doi.org/10.35451/jkf.v4i1.849

Notoatmodjo, S. (2018). *Metodologi penelitian kesehatan (2018)* (Jakarta). Rineka Cipta. //opac.poltekkestasikmalaya.ac.id%2Findex.php%3Fp%3Dshow_detail%26id%3D3190

Sugiyono, P. D. (2018). Quantitative, qualitative, and R&D research methods. *Bandung: ALFABETA, Ed.* https://scholar.google.com/scholar?cluster=12880107038140743592&hl=en&oi=scholarr

Tarigan, U. S. P. (2025). HUBUNGAN PERSONAL HYGIENE DENGAN GEJALA DERMATITIS KONTAK IRITAN PADA PEKERJA LAUNDRY KONVENSIONAL DI KELURAHAN SUMBER JAYA KECAMATAN SIANTAR MARTOBA. *Jurnal Penelitian Kesmasy*, *7*(2), Article 2. https://doi.org/10.36656/jpksy.v7i2.2366

Thoyiba, A., & Rahma, N. S. (2025). *Faktor-Faktor Yang Berhubungan Dengan Kejadian Penyakit Dermatitis Kontak Pada Pengrajin Batik*. *3*(1).

Whitmore, R., Leonardi-Bee, J., Naughton, F., Sutton, S., Cooper, S., Parrott, S. J., Hewitt, C. E., Clark, M., Ussher, M., Jones, M., Torgerson, D. J., & Coleman, T. (2019). Effectiveness and Cost-Effectiveness of a Tailored Text Message Programme (MiQuit) for Smoking Cessation in Pregnancy: Study Protocol for a Randomised Controlled Trial and Meta Analysis. *Trials*, *20*(280 (2019)). https://doi.org/10.1186/s13063-019-3341-4

Wijayanti, R., & Sumardiyono, S. (2019). PENGARUH PAPARAN ZAT PEWARNA BATIK TERHADAP KEJADIAN DERMATITIS KONTAK IRITAN PADA PEKERJA BATIK DI SURAKARTA. *Jurnal Bakti Masyarakat Indonesia*, *2*(1), Article 1. https://doi.org/10.24912/jbmi.v2i1.4317

Zhao, H., & Lin, B. (2020). Impact of foreign trade on energy efficiency in China's textile industry. *Journal of Cleaner Production*, *245*, 118878. https://doi.org/10.1016/j.jclepro.2019.118878