Available Online at www.e-iph.co.uk
Indexed in Clarivate Analytics WoS, and ScienceOPEN

E-B
Environment - Behaviour Proceedings Journal

ISSEC-24
https://sites.google.com/view/issec-2024/home
International Social Science & Educational Conference 2024
Virtual conference, 07-08 Dec 2024
Organised by: CLM Publishing Resources, Malaysia

e-IPH
e-International Publishing House Ltd., United Kingdom

Psychosocial Dimension in Post-Cancer Quality Of Life: The Fuzzy Delphi Method

Ahmad Saharrudin Mat Akir[1], Engku Mardiah Engku Kamarudin[1]*, Noor Syamilah Zakaria[1], Siti Nordarma Ab Rahman[2], Ramlan Mustapha[3]
**Corresponding Author*

[1] Faculty of Education Studies, Universiti Putra Malaysia (UPM), Serdang, Malaysia, [2] School of Educational Studies, Universiti Sains Malaysia (USM), Penang, Malaysia, [3]Academy of Islamic and Contemporary Studies (Raub Campus), Universiti Teknologi MARA, Raub, Malaysia

Amad454n@gmail.com, engkumardiah@upm.edu.my, syamilah@upm.edu.my, sitinordarma@gmail.com, Mujahidpahang@gmail.com
Tel: +60136130780

Abstract
Using the Fuzzy Delphi Method, this study thoroughly examined the psychosocial aspects affecting breast cancer survivors' quality of life. The study featured a panel of five experts who evaluated various aspects of quality of life using a Multi-Research Method approach. The study examined four main areas: environmental factors, physical health, psychological well-being, and social connections. The findings highlight the importance of implementing integrated support systems that address psychological and physical needs. They also highlight the need of developing comprehensive screening tools and more customized survivorship care strategies.

Keywords: Cancer Survivorship, Fuzzy Delphi Method, Quality of Life

DOI: https://doi.org/10.21834/e-bpj.v10iSI24.6387

1.0 Introduction

1.1 With an expected 2.26 million cases in 2020, breast cancer is the most common cause of cancer-related deaths among women and commonly diagnosed worldwide health issue (Wilkinson & Gathani, 2022). The growing challenge of cancer also affects women in Asia, including Malaysia. In addition, the high increase in cancer cases in the world region is due to human development undergoing economic transformation (Wilkinson & Gathani, 2022). Due to the increase in breast cancer cases, progress in the treatment of the disease has been achieved (Mokhatri & Montazeri, 2020). With this, women now have a higher chance of surviving breast cancer because of early detection and improved treatment options. Rebuilding life could be very challenging for survivors as they have unique psychological, social, physical, and spiritual health needs. Patient survival outcomes, including disease-free survival, are also increasing (Cardoso et al., 2019).

However, the majority of cancer treatments significantly affect the quality of life, leaving physical and psychosocial side effects that can affect the physical function and mental well-being of breast cancer patients (Mokhatri & Montazeri, 2020). Breast cancer survivors face challenges even after successful treatment, such as depression, anxiety, stress, lifestyle changes, body image issues and

eISSN: 2398-4287 © 2025. The Authors. Published for AMER by e-International Publishing House, Ltd., UK. This is an open-access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/). Peer–review under the responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers.
DOI: https://doi.org/10.21834/e-bpj.v10iSI24.6387

challenges in health management (Durosini et al., 2022). The quality of life in terms of health is defined as the patient's perception of their physical, mental and social health, which is affected by diagnosis, treatment, after-treatment and survival (Mokhatri & Montazeri, 2020). Psychosocial exposure could be defined as an exposure that can affect physical health outcomes through psychological mechanisms (Williams et al., 2022).

1.2 Survival in breast cancer patients is a significant and relevant topic and should be given more attention. However, there is a lack of studies that examine the quality of life among breast cancer patients (Mokhatri & Montazeri, 2020). Little research exists on other aspects, like spiritual dimensions and cultural experiences, but this study concentrates on family support, hope, and optimism (Aitken & Hossan, 2022). Research on how different additional forms of support, including the community, might effectively lower patients' psychological stress is lacking in this study, even though family support is recognized as a crucial component in enhancing the quality of life (Phoosuwan & Lundberg, 2022). This study will use the fuzzy Delphi approach to identify and examine the primary psychosocial factors impacting breast cancer patient's quality of life following treatment. These include social interactions, psychology, physical health, and environmental factors. The importance of this study lies in understanding the psychosocial dimensions that affect the quality of life of cancer patients in depth and holistically. Using the Fuzzy Delphi method, this study enables the integration of expert views from various fields, providing a more comprehensive perspective on the psychosocial challenges and factors that affect the quality of life of former cancer patients. Therefore, using the Fuzzy Delphi Method, this study aims to determine experts' perspectives on the main determinants of quality of life among breast cancer survivors.

This study uses the Fuzzy Delphi approach to focus on the distinct psychosocial aspects of breast cancer patients, like hope and family support, from an expert perspective. It addresses the deficiency of standardized instruments like the WHOQOL-BREF. Concentrating on the local context guarantees more tailored and pertinent intervention tactics, and regional data enhances healthcare. A self-report questionnaire, or the WHOQOL-BREF instrument, evaluates quality of life in four key areas: environmental, social relation, psychological, and physical. Cancer patients who have recovered can benefit from this model since it offers a comprehensive view of their quality of life based on a number of factors. The development of more individualized and customized intervention strategies and support services to lower long-term physical and psychological morbidity may be made possible by an understanding of the impact of psychosocial determinants on quality of life among breast cancer survivors (Culbertson et al., 2020).

2.0 Literature Review

2.1 The psychosocial dimension is a critical element in determining the quality of life of cancer patients, especially after treatment. Individuals would often face various physical challenges and intense psychological, social, and emotional effects. Patients' and survivors' quality of life could possibly be impacted by side effects of cancer treatment that persist during the survivorship phase. (Saevarsdottir & Gudmundsdottir, 2023). In addition to medical experts, women who survive breast cancer require psychosocial support and care from friends and family (Drageset et al., 2021). Interventions, social support and their community may help improve the quality of life of breast cancer patients (Mokhatri & Montazeri, 2020). There are many psychosocial determinants that are associated with quality of life among breast cancer survivors. The most frequently studied psychosocial determinants are social support, depression and evaluation of future perspectives (Culbertson et al., 2020). A number of factors, such as relationships, women's health, employment, fertility, menopause, and anxiety, are also used to gauge the quality of life of former cancer patients (Williams et al., 2022). A higher quality of life is linked to psychosocial variables that have more positive and fewer negative consequences. For instance, quality of life is directly correlated with their level of social support and sadness (Culbertson et al., 2020). Therefore, in order to enhance the quality of life and guarantee that breast cancer survivors can live healthier lives, comprehensive monitoring and care of psychosocial components is crucial.

2.2 Fear of recurrence, exhaustion, altered sleep patterns, impacts on intimacy and sex, and problems with money and employment are among the common psychosocial problems encountered in psychology (Jon Emery et al., 2022). Other issues that are frequently faced include menopause symptoms, anxiety, discomfort, and exhaustion. These issues can significantly affect the patient's everyday activities and, in turn, their quality of life (Mokhatri & Montazeri, 2020). Thus, their pain is lessened by a comprehensive strategy that emphasizes psychological, social, and spiritual elements with an interdisciplinary focus (Drageset et al., 2021). Emotional abilities such as emotional intelligence, emotional management, mood improvement, and resilience play a significant role in the challenges for cancer survivors in maintaining quality of life (Durosini et al., 2022). By focusing on the psychological and spiritual aspects, cancer survivors can overcome physical challenges, increase mental resilience, and improve their overall quality of life.

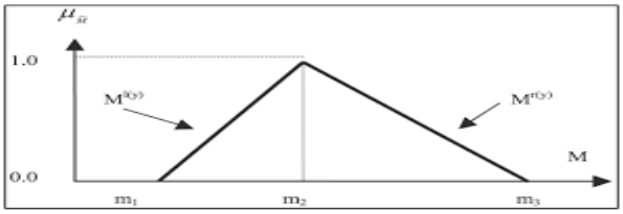
Survivorship care planning is essential to further understand the psychosocial factors associated with better or worse quality of life in breast cancer survivors (Culbertson et al., 2020). In relation to this, quality and interactive supportive care programs are needed to reduce chronic effects. This is because lack of physical activity and practising inactive behaviour are associated with risk factors related to chronic diseases and quality of life in cancer patients (Trinh et al., 2022). Over the past ten years, studies have also demonstrated the positive effects of physical activity on quality of life, anxiety, and depression in breast cancer survivors (Sun et al., 2023). More substantial efforts are required to preserve quality of life for former cancer patients, since cancer survivorship is now acknowledged as a crucial aspect of cancer care (Trinh et al., 2022). A deeper understanding of psychosocial factors can influence the well-being of breast cancer survivors and enable the planning of more effective support programs.

3.0 Methodology

3.1 Richie and Klein (2007) Multi-Research Method technique was used in this study. First, the researcher compiled the relevant literature on the primary impacts of fake news in society. The researcher then proceeded to step 2, which involved using the Fuzzy Delphi Method, which is based on expert consensus. One way to come to an agreement on what to build was to use the Fuzzy Delphi method. The Delphi survey is an iterative, multi-stage approach for group facilitation that is intended to convert viewpoints into consensus (Hasson et al., 2000). An expert consent assessment tool was provided by the researcher to the built structure. Prior to data analysis, a list of the most important effects of false news was compiled by the consensus of experts. The Fuzzy Delphi Method was employed in this investigation. Participants were chosen using purposive sampling. Since the researcher requires experts' agreement on a predetermined topic, this technique is suitable. The most acceptable approach for the Fuzzy Delphi Method is deliberate sampling, which was claimed by Hasson, Keeney, and McKenna (2000). Participants who actively participated in the group discussion and fulfilled the inclusion criteria were chosen by the researcher. Experts were selected among breast cancer patients who have recovered from treatment within 5 years. A total of 5 experts, including the researcher, conducted a face-to-face session in the Penang Head of State Abdullah Fahim Mosque meeting room. The session lasted for 2 hours.

3.2

Table 1 Fuzzy Delphi Steps

	Step		Formulation
1.	Expert selection	●	Five experts were chosen in this report. To determine the importance of the evaluation parameters on the elements to be assessed using linguistic variables, definitions of possible issues with the piece, and other information, a panel of experts are gathered.
2.	Determining linguistic scale	●	All linguistic variables must be converted into a fuzzy triangle (triangular fuzzy number) which counts as a part of this process. Fuzzy numbers are also added to the translation of linguistic variables as a part of this step (Hsieh et al., 2004). Written as (m1, m2, m3), the Triangular Fuzzy Number is a representation of the values m1, m2, and m3. A rational value is represented by m2, the smallest possible value is represented by m1, and the highest possible value is represented by m3. At the same time, a fuzzy scale is created using a triangular fuzzy number to translate linguistic variables into fuzzy numbers.  Figure 1: Triangular fuzzy number
3.	The determination of linguistic variables and average responses	●	All measurement results must be converted to fuzzy scales by the researcher after receiving feedback from the designated expert. According to Benitez et al. (2007), this is often known as acknowledging each response.
4.	The determination of threshold value "d"	●	When assessing the level of expert consensus, the threshold value is essential. The following formula is used to find the distances for any fuzzy integer m = (m1, m2, m3) and n = (m1, m2, m3): $$d(\bar{m},\bar{n}) = \sqrt{\frac{1}{3}\left[(m1-n1)^2 + (m2-n2)^2 + (m3-n3)^2\right]}$$
5.	Identify the alpha cut the aggregate level of fuzzy assessment.	●	If an expert consensus is reached, each item is assigned a fuzzy number (Mustapha & Darussalam, 2017). The following is the procedure for calculating and assessing fuzzy values: (1) Amax = 4 (m1 + 2m2 + m3).
6.	Defuzzification process	●	The formula Amax = (1)⁄4 (a1 + 2am + a3) is used in this procedure. The score number that results from the researcher using average fuzzy numbers or average response falls between 0 and 1. A = 1/3 * (m1 + m2 + m3), A = 1/4 * (m1 + 2m2 + m3), or A = 1/6 * (m1 + 4m2 + m3) are the three formulas used in this method. The median value for '0' and '1' is equal to the α-cut value, which is equal to (0 + 1) / 2 = 0.5. The item will be discarded if it does not show expert agreement when the result of A value is less than the α-cut value = 0.5. The alpha cut value needs to be higher than 0.5.
7.	Ranking process	●	The expert consensus is that the positioning process is executed by defining elements according to defuzzification values, with the most important element serving as the most important location for decision-making.

Using past published and relevant literature, the researcher developed the Fuzzy Delphi research tool. Focus groups, expert interviews, and research material were used to create questions for the Fuzzy Delphi method (Mustapha & Darussalam, 2017). Therefore, the researcher examined the primary impacts of fake news in society using published work and literature. A list of expert questions was then produced using a 7-point ranking system. Since research has shown that using many scales yields precise and perfect results, the 7-point scale was used (Chen et al., 2011). To make it simpler for experts to fill out the questionnaire, the researcher replaced the fuzzy value in Table 4 with a number on a scale of 1 to 7, as shown:

Table 2 Fuzzy Scale

Items	Fuzzy numbers
Strongly disagree	(0.0, 0.0, 0.1)
Disagree	(0.0, 0.1, 0.3)
Somewhat disagree	(0.1, 0.3, 0.5)
Neutral	(0.3, 0.5, 0.7)
Somewhat agree	(0.5, 0.7, 0.9)
Agree	(0.7, 0.9, 1.0
Strongly agree	(0.9, 1.0, 1.0)

4.0 Findings

4.1 Environment

Table 3 Quality of Life for Environmental Items

Statistics	Access care	Finance	Home environment	Access to information	Ability to return to work
Value of the item	0.02771	0.04619	0.02771	0.05543	0.05543
Value of the construct					0.04249
Item < 0.2	5	5	5	5	5
% of items < 0.2	100%	100%	100%	100%	100%
Average of % consensus					100
Defuzzification	0.96	0.9	0.96	0.92	0.92
Ranking	1	3	1	2	2
Status	Accepted	Accepted	Accepted	Accepted	Accepted

All five items demonstrated a high consensus among the experts, with 100% agreement across all items (all values < 0.2). The defuzzification scores for all items were remarkably high, ranging from 0.90 to 0.96, indicating strong acceptance of each aspect. Access to care and home environment ranked highest, with a defuzzification score of 0.96. Access to information and ability to return to work were tied for second place, scoring 0.92. Finance ranked third with a score of 0.90, although still within the acceptance range. The overall value of the environment construct was calculated at 0.04249. The two most important aspects of enhancing the quality of life for people with breast cancer are access to healthcare and the home environment. Attention was also paid to the capacity to retrieve information and resume work. With a high defuzzification score and 100% consensus, every element of the environment demonstrated its significance in patient care. These results suggest that all examined aspects of the environment are considered necessary in the study, with a solid emphasis on patients' access to care and their home environment. The findings highlight the multifaceted nature of environmental considerations in healthcare and patients' well-being.

4.2 Physical Health

Table 4 Quality of Life for Physical Health Items

Statistics	Daily activities	Level of pain	Quality of sleep	Energy and fatigue	Treatment effect
Value of the item	0.05542	0.08314	0.02771	0.04619	0.02771
Value of the construct					0.04803
Item < 0.2	5	5	5	5	5
% of items < 0.2	100%	100%	100%	100%	100%
Average of % consensus					100
Defuzzification	0.94	0.88	0.96	0.9	0.96
Ranking	2	4	1	3	1
Status	Accepted	Accepted	Accepted	Accepted	Accepted

The findings were based on evaluations from five experts. All five items showed a high consensus among the experts, with 100% agreement across all items (all values < 0.2). The defuzzification scores for all items ranged from 0.88 to 0.96, indicating strong acceptance of each aspect. Quality of sleep and treatment effect ranked highest, with a defuzzification score of 0.96. Daily activities followed closely with a score of 0.94, while energy and fatigue ranked third with a score of 0.90. The level of pain, although scoring the lowest at 0.88, was still within the acceptance range. The overall value of the physical health construct was calculated at 0.04803. These

results suggest that all examined aspects of physical health are considered necessary in the study, with a solid emphasis on patients' sleep quality and treatment effects. Energy and daily activities are also necessary. Despite having the lowest pain score, it was still within the acceptable range for experts. The high consensus and acceptance rates across all items underscore the significance of various physical health factors. The findings highlight the multifaceted nature of physical health considerations in patient well-being and recovery.

4.3 Psychological

Table 5 Quality of Life for Psychological Items

Statistics	Anxiety	Body image changes	Stress management	Hope and optimism	Perception of the purpose of life
Value of the item	0.02771	0.09238	0.0739	0.01848	0.05542
Value of the construct					0.05358
Item < 0.2	5	5	5	5	5
% of items < 0.2	100%	100%	100%	100%	100%
Average of % consensus					100
Defuzzification	0.96	0.8	0.86	0.98	0.94
Ranking	2	5	4	1	3
Status	Accepted	Accepted	Accepted	Accepted	Accepted

With 100% agreement across all five items (all values < 0.2), the experts showed a high level of agreement. The exceptionally high defuzzification scores showed the strong acceptability of each feature for each item, which ranged from 0.80 to 0.98. With a defuzzification score of 0.98, hope and optimism came in first, followed by anxiety at 0.96. With a score of 0.94, perception of life's purpose came in third, while stress management skills came in at 0.86. Despite having the lowest score (0.80), body image modifications were still within the acceptable range. The psychological construct's total value was determined to be 0.05358. Hope and optimism are the most crucial psychological components for assisting patients in overcoming obstacles after treatment. Other essential elements include anxiety, stress management, and a sense of purpose in life. Even with the lowest score, a change in body image is still thought to be required. These findings imply that every facet of psychological items examined are deemed essential for the research, highlighting the patients' capacity for anxiety management as well as their sense of hope and optimism. The high percentages of agreement and acceptance for each item highlight the importance of many psychological aspects in the setting under evaluation, which might be connected to the quality of life for those who have had cancer. The results demonstrate how intricate psychological factors are to general mental health and patient healing.

4.4 Social Relations

Table 6 Quality of Life Social Relations for Items

Statistics	Family support	Interpersonal	Community activities	Sexual	Friend support
Value of the item	0	0.05543	0.01848	0.10623	0.05543
Value of the construct					0.04711
Item < 0.2	5	5	5	5	5
% of items < 0.2	100%	100%	100%	100%	100%
Average of % consensus					100
Defuzzification	1	0.92	0.98	0.72	0.92
Ranking	1	3	2	4	3
Status	Accepted	Accepted	Accepted	Accepted	Accepted

All five dimensions exhibited expert consensus, with 100% agreement across all items (values < 0.2). Based on their defuzzification scores, the investigation showed that the social relations components varied in importance. With the highest possible score of 1.0, family support was the most crucial component and ranked first out of all the criteria. With a defuzzification score of 0.98, community activities came in second. Both friend support and interpersonal relationships received a defuzzification score of 0.92, tying for third place. Although still considered significant, sexual activity came in at number four with the lowest defuzzification score of 0.72. With an overall construct value of 0.04711, the social relations component was found to have a strong validity overall. Family support was found to be the most crucial element in this dimension, followed by friend and community support. While sexual activity receives attention but a lesser score, interpersonal relationships are also deemed relevant. These findings underline the critical significance of community involvement and more comprehensive social ties in evaluating quality of life.

5.0 Discussion

5.1 The findings offer various vital insights into the psychological factors influencing the quality of life for breast cancer survivors. All four domains- environmental, physical health, psychological, and social relations showed high levels of agreement when the Fuzzy Delphi Method was used in the study. Family support and hope/optimism were given special attention. These findings validate the WHOQOL-BREF theoretical framework's usefulness in cancer survivorship scenarios by aligning with it. Access to care and home environment, which were revealed as essential factors of quality of life, are key findings that highlight the interconnectedness of environmental elements, both physically and psychologically.

5.2 The psychological domain results show an especially high ranking of optimism and hope as well as the significance of emotional resilience in survivorship. It is also worth noting that despite having the lowest score among social connection characteristics, sexual activity was still within the acceptable range. This indicates that intimate relationships, despite their potentially delicate nature, must be addressed in a comprehensive approach to survivor's care. This study also emphasizes the potential benefits of using thorough screening instruments that evaluate various aspects of quality of life. Healthcare professionals may be able to recognize and meet the various needs of cancer survivors better, leading to more individualized and successful survivorship care plans. According to psychological resilience theory, this study's results enhance the WHOQOL-BREF theory by highlighting the particular requirements of breast cancer patients in the community, especially those related to family support, hope, and life purpose. This study emphasizes the value of comprehensive intervention strategies to enhance patients' quality of life and address gaps in existing practice, such as the neglect of close connections and community support. These results also serve as the foundation for a more thorough screening and care strategy.

6.0 Conclusion & Recommendations

This research provides a strong framework for comprehending survival experiences. However, some restrictions, like the expert panel's limited size, the local context's limits, and a methodological approach that depends on expert consensus, might not accurately represent patients' subjective experiences. In retrospect, the Fuzzy Delphi Method proved effective for capturing expert consensus on complex psychosocial factors, suggesting its viability for future studies in healthcare research. Timepoint studies' nature precludes the investigation of long-term changes, and other dimensions like spiritual and cultural aspects are not thoroughly examined. In conclusion, this study has provided valuable insights into the psychosocial dimensions affecting breast cancer survivors' quality of life through the Fuzzy Delphi Method, emphasizing the critical importance of family support, hope/optimism, and healthcare despite the research's critical importance. Healthcare practitioners should create accessible care pathways, use thorough screening methods that evaluate all specified quality of life areas, and create focused interventions that strengthen family support networks to improve their situation. The effectiveness of integrated intervention programs should be investigated, cultural differences in survival experiences should be examined, and longitudinal studies should be used to explore the dynamic interactions between environmental, physical, psychological, and social dimensions. To gain a more thorough understanding of the quality of life, future research is advised to employ mixed methods techniques, integrate the Fuzzy Delphi Method with qualitative and quantitative surveys, increase the number and diversity of participants, and investigate holistic elements like spiritual and cultural aspects.

Acknowledgement

The authors express their gratitude to each participant who kindly shared their experiences during the study's data gathering.

Paper Contribution to Related Field of Study

By using the Fuzzy Delphi Method to focus on psychosocial factors like family support, hope, and optimism, the research paper offers a broad and significant contribution to cancer patients, survivors, clinical practice, and the creation of health care policy, particularly about the quality of life of breast cancer patients. A more comprehensive and culturally appropriate approach enhances already-existing models like WHOQOL-BREF. It is the foundation for more individualized and successful healthcare policies and intervention techniques, particularly in community support and survivorship.

References

Aitken, L. A., & Hossan, S. Z. (2022). The psychological distress and quality of life of breast cancer survivors in Sydney, Australia. In *Healthcare* (Vol. 10, No. 10, p. 2017). MDPI

Cardoso, F., Kyriakides, S., Ohno, S., Penault-Llorca, F., Poortmans, P., Rubio, I. T., ... & Senkus, E. (2019). Early breast cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Annals of Oncology, 30*(8), 1194–1220.

Chen, C. T., Pai, P. F., & Hung, W. Z. (2011). An integrated methodology using linguistic PROMETHEE and maximum deviation method for third-party logistics supplier selection. *International Journal of Computational Intelligence Systems, 4*(5), 762–773.

Culbertson, M. G., Bennett, K., Kelly, C. M., Sharp, L., & Cahir, C. (2020). The psychosocial determinants of quality of life in breast cancer survivors: A scoping review. *BMC Cancer, 20*, 1–36.

Drageset, S., Austrheim, G., & Ellingsen, S. (2021). Quality of life of women living with metastatic breast cancer and receiving palliative care: A systematic review. *Health Care for Women International, 42*(7–9), 1044–1065.

Durosini, I., Triberti, S., Savioni, L., Sebri, V., & Pravettoni, G. (2022). The role of emotion-related abilities in the quality of life of breast cancer survivors: A systematic review. *International Journal of Environmental Research and Public Health, 19*(19), 12704.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing, 32*(4), 1008–1015.

Hsieh, T. Y., Lu, S. T., & Tzeng, G. H. (2004). Fuzzy MCDM approach for planning and design tenders selection in public office buildings. *International Journal of Project Management*. https://doi.org/10.1016/j.ijproman.2004.01.002

Mokhatri-Hesari, P., & Montazeri, A. (2020). Health-related quality of life in breast cancer patients: Review of reviews from 2008 to 2018. *Health and Quality of Life Outcomes, 18*, 1–25.

Mustapha, R., & Darusalam, G. (2017). *Aplikasi kaedah Fuzzy Delphi dalam kajian sains sosial*. Penerbitan Universiti Malaya.

Phoosuwan, N., & Lundberg, P. C. (2022). Psychological distress and health-related quality of life among women with breast cancer: a descriptive cross-sectional study. *Supportive Care in Cancer*, 1-10.

Saevarsdottir, S. R., & Gudmundsdottir, S. L. (2023). Mobile apps and quality of life in patients with breast cancer and survivors: Systematic literature review. *Journal of Medical Internet Research, 25*, e42852.

Sun, M., Liu, C., Lu, Y., Zhu, F., Li, H., & Lu, Q. (2023). Effects of physical activity on quality of life, anxiety, and depression in breast cancer survivors: A systematic review and meta-analysis. *Asian Nursing Research*.

Trinh, L., Sabiston, C. M., Alibhai, S. M., Jones, J., Arbour-Nicitopoulos, K., Mina, D. S., ... & Faulkner, G. E. (2022). A distance-based, randomized controlled trial for reducing sedentary behavior among prostate cancer survivors: A study protocol. *BMC Public Health, 22*(1), 855.

Wilkinson, L., & Gathani, T. (2022). Understanding breast cancer as a global health concern. *The British Journal of Radiology, 95*(1130), 20211033.

Williams, D., Chiu, Y. W., Khorsandi, N., Moses, L., & Craft, B. (2022). Quality of life concerns of young breast cancer survivors in the US Gulf States by race at treatment and one-year post-treatment. *Archives of Breast Cancer*, 40–49.

World Health Organization. (2019). WHO definition of palliative care. http://www.who.int/cancer/palliative/definition/en/