HEALTHCARE SC DALAM *DISASTER OPERATION* DI INDONESIA: *STATE OF THE ART*

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(Received: October 20, 2021/Accepted: October 11, 2022)

Abstrak

Ketika terjadi bencana alam, korban baik yang meninggal, maupun yang selamat membutuhkan bantuan seperti makanan, air bersih, farmasi, tenda peralatan medis, dan tenaga medis. Saat terjadi bencana alam, bantuan untuk layanan kesehatan (healthcare) dapat dikategorikan menjadi relief goods, seperti barang medis dan service goods, seperti tim medis. Healthcare dalam kondisi normal berbeda dengan healthcare dalam kondisi bencana. Healthcare dalam kondisi bencana atau yang dikenal dengan healthcare dalam operasi kemanusiaan (humanitarian operation) memiliki sifat yang mendadak dan mendesak sehingga sulit untuk diprediksi. Operasi kemanusiaan pada umumnya membutuhkan jaringan supply chain (SC) yang terkait dengan healthcare, termasuk farmasi dan tenaga medis. Namun, tidak seperti healthcare pada umumnya, healthcare dalam operasi kemanusiaan memiliki sifat yang tiba-tiba dan mendesak, sehingga lebih sulit untuk diprediksi. Penelitian ini merupakan studi literatur terkait penelitian healthcare SC dalam operasi kemanusiaan. Penelitian-penelitian tersebut dikategorikan ke dalam tiga tema: healthcare, disaster, dan healthcare in natural disaster. Topik penelitian berisi Operation Management, Coordination Mechanism, Logistic Operation, Funding, Scheduling, Location Optimization, Performance, Procurement, Information Technology, Inventory Management & Control, Service Management, dan Strategy Management. Tipe dari metode penelitian berisi Optimization, Simulation, Case Study, Literature Review, Empirical Study, and Theory/Conceptual.

Kata kunci: *bencana; darurat; layanan kesehatan; sumber daya*

Abstract

[Title: Healthcare SC in Disaster Operation in Indonesia: State of the Art] *When a natural disaster occurs, there are always casualties. Both the dead and the survivors need assistance such as food, clean water, pharmacy, tent, medical equipment, and medical personnel. When a natural disaster occurs, assistance for healthcare can be categorized into relief goods, such as medical goods and service goods, such as medical teams. Healthcare under normal conditions is different from healthcare in disaster conditions. Healthcare in a disaster condition or known as healthcare in humanitarian operation, has a sudden and urgent nature, making it difficult to predict. The humanitarian operation generally requires a supply chain (SC) network related to healthcare, including pharmaceuticals and medical personnel. However, unlike healthcare in general, healthcare in humanitarian operations has a sudden and urgent nature, making it more difficult to predict. This paper is a literature study related to research in healthcare SC in humanitarian operations and can be categorized into three themes: healthcare, disaster, and healthcare in a natural disaster. The topic research contains Operation Management, Coordination Mechanism, Logistic Operation, Distribution, Funding, Scheduling, Location Optimization, Performance, Procurement, Information Technology, Inventory Management & Control, Service Management, and Strategy Management The type of research methods contains Optimization, Simulation, Case Study, Literature Review, Empirical Study, and Theory/Conceptual.*

Keywords: *disasters; emergency; healthcare; resource*

1. Pendahuluan

Pada tahun 2019, COVID-19 merupakan pandemi yang berdampak ke 230 negara, mempengaruhi 754.000 jiwa, dan korban meninggal sebanyak 36.500 jiwa hingga akhir Maret 2020. Sebelumnya, pandemi ini menjadi wabah virus yang

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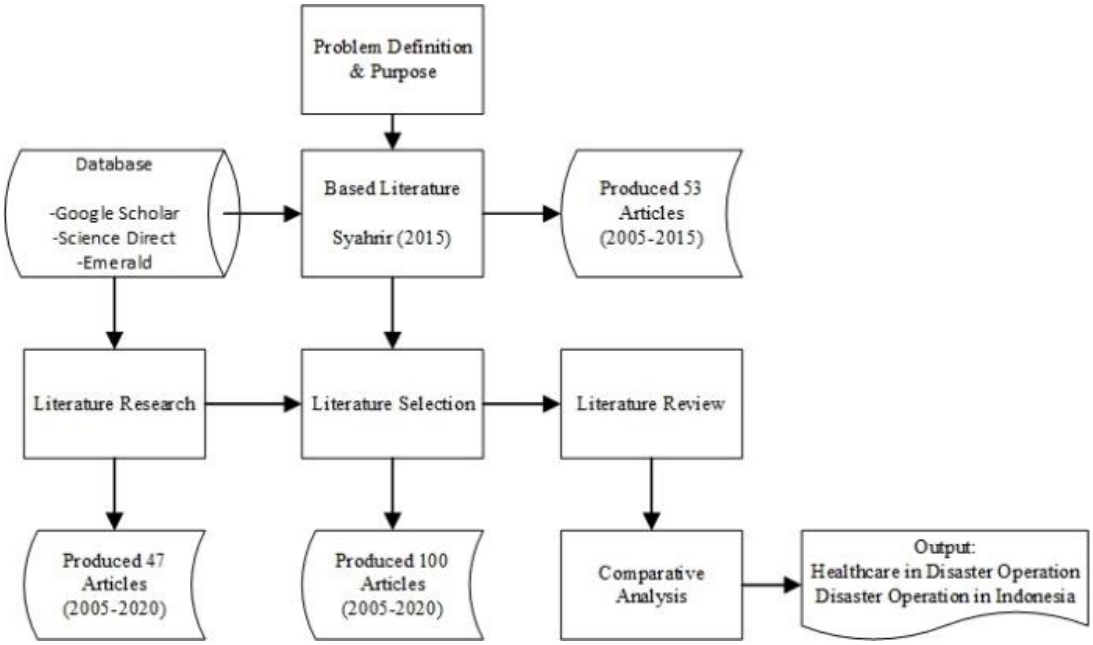


Gambar 1. *Research Framework*

belum diketahui di Wuhan, China pada tahun 2019. Virus ini menyebar dengan cepat, sehingga jika masyarakat dihadapi dengan kekurangan peralatan medis/kesehatan, peningkatan jumlah orang yang terinfeksi akan menjadi banyak dan menyebabkan bencana (Govindan et al., 2020). Jika terjadi bencana, baik bencana yang disebabkan oleh alam (*natural disaster*), maupun disebabkan oleh manusia (*man-made disaster*), maka pemerintah dan organisasi kemanusiaan akan mengirimkan bantuan ke daerah bencana. Kegiatan tersebut bisa disebut dengan operasi kemanusiaan (*humanitarian operation*).

Operasi kemanusiaan adalah operasi untuk meringankan penderitaan masyarakat yang membutuhkan bantuan karena terjadi sebuah bencana, baik akibat alam maupun manusia. Organisasi kemanusiaan biasa memprioritaskan barang bantuan di lokasi strategis yang mudah dijangkau (Torabi et al., 2018). Selain barang bantuan berupa pangan dan sandang, daerah yang terkena bencana juga membutuhkan semua hal terkait kesehatan (*healthcare*) berupa obat-obatan, peralatan kesehatan, dan tenaga medis (*medical*).

Dalam *humanitarian operation*, pengaturan tenaga medis ini menjadi sesuatu hal yang penting, seperti mengirim bantuan tenaga kesehatan dalam operasi kemanusiaan. Pengaturan barang bantuan dan tenaga medis menjadi isu penting dalam *humanitarian operation*, karena setiap situasi *disaster* memiliki tingkat kepentingan yang berbeda. Barang dan jasa memiliki aliran SC yang berbeda sesuai tingkat kepentingannya. Dalam kepentingan seperti situasi darurat, diperlukan waktu respon yang cepat dari aliran SC. Isu kesehatan terutama, hal-hal terkait pengadaan, pengiriman, obat-obatan, peralatan medis, dan tenaga medis ke daerah bencana. Penelitian ini membahas terkait studi literatur yang berbicara tentang *healthcare* dalam *disaster*.

Mengacu Grant & Booth (2009), penelitian ini termasuk *Mapping Review/Systematic Map* yang memetakan dan mengkategorikan literatur yang ada untuk melakukan tinjauan lebih lanjut dan/atau penelitian dengan mengidentifikasi kesenjangan dalam literatur penelitian.

2. Metodologi Penelitian

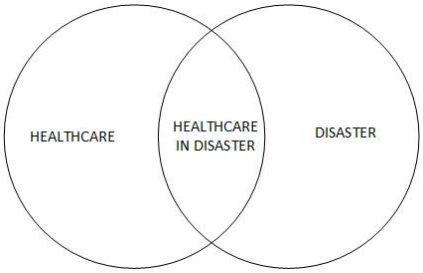
Literatur dikumpulkan dengan mencari di beberapa *database*, seperti ScienceDirect, Emerald, dan Google Scholar menggunakan beberapa kata kunci, seperti *healthcare*, *humanitarian*, dan *disaster*. Literatur yang terpilih adalah literatur yang tahun terbitnya kurang dari 15 tahun terakhir karena artikel tersebut masih relevan dengan kondisi saat ini. Artikel yang telah dipilih kemudian dipilah menjadi 3 tema, yaitu *healthcare*, *disaster*, dan *healthcare in disaster* dengan tujuan untuk membandingkan penelitian ini dengan Syahrir et al. (2015) untuk melihat apakah ada perkembangan topik dan metode penelitian dari penelitian tersebut.

Dalam penelitian ini terdapat kriteria inklusi dan eksklusi. Kriteria inklusi penelitian ini adalah terdapat topik *healthcare* dalam topik *humanitarian*, namun *healthcare* dalam topik tersebut berbeda dengan *healthcare* pada umumnya, dimana *healthcare* pada umumnya berada dalam kondisi normal, sedangkan dalam *humanitarian*, *healthcare* berada dalam kondisi abnormal, seperti *disaster*. Kriteria eksklusi penelitian ini adalah *natural disaster* karena penelitian ini berfokus pada *natural disaster*. Berbeda *natural disaster* yang disebabkan alam sehingga lebih mudah diprediksi, *man-made disaster* disebabkan oleh manusia dengan berbagai penyebab, sehingga lebih kompleks untuk dianalisis dalam penelitian ini. Gambaran metode penelitian dapat dilihat pada **Gambar 1**.

3. Hasil dan Pembahasan

Pengaturan bantuan *healthcare* dalam kondisi bencana berbeda dengan kondisi normal, dimana dalam kondisi normal lebih mudah diprediksi karena pasien

dapat membuat reservasi dengan fasilitas kesehatan. Sedangkan dalam kondisi bencana lebih susah diprediksi karena bersifat darurat. Saat terjadi bencana selalu ada korban jiwa yang disebabkan bencana tersebut. Pada kondisi ini, *healthcare* dalam bencana dibutuhkan untuk mengurangi korban bencana berlebih. **Gambar 2** menunjukkan interseksi dalam tema *healthcare in disaster* yang berada di dalam tema *disaster* dan *healthcare*.



Gambar 2. Interseksi Antar Tema Penelitian

Tabel 1. Penambahan Penelitian Tema pada Topik Penelitian

Topik Penelitian	*Disaster*	*Healthcare*	*Healthcare in Disaster*
Operation Management	Fathalikhani et al. (2019), Fahimnia et al. (2017), Sheu (2016), Yang & Xu (2015), Matsuo (2015), Fakhruddin & Chivakidakarn (2014), Scarpin & De Oliveira Silva (2014), Chakravarty (2014), Andersson-Sköld et al. (2013), Ranger & Surminskin (2013), Becker & Tehler (2013), John & Ramesh (2012), Balcik et al. (2010), Stewart et al. (2009), Richey (2009), Altay & Green (2006), Hale & Moberg (2005)	Gupta & Ramesh (2015), Purwaningsih et al. (2014), Narayana et al. (2014), Dobrzykowski et al. (2014), Bhakoo & Choi (2013), Chen et al. (2013), Beliën & Forcé (2012), Assi et al., (2012)	Syahrir et al. (2015), Rachaniotis et al. (2012)
Coordination Mechanism	Li et al. (2019)		
Logistic Operation	Noham & Tzur (2018), Torabi et al. (2018), Gil & McNeil (2015), Costa et al. (2012), Pujawan et al. (2009)	Kumar et al. (2008)	
Distribution	Cao et al. (2018)		
Funding	Burkart et al. (2016)		
Scheduling	Santoso et al. (2019)		
Location Optimization	Boonmee et al. (2018), Tavana et al. (2018), Habibi-Kouchaksaraei et al. (2018), Gutierrez & Mutuc (2018)	Lucchese et al. (2020)	
Performance	Dubey et al. (2019)		
Procurement	Haavisto & Kovács (2015)		
Information Technology	Ashar et al. (2016), Kabra & Ramesh (2015), Park et al. (2013)	Govindan et al. (2020), Arya et al. (2015), Lu et al. (2013), Reyes et al. (2012), Maass & Varshney (2012), Chan et al. (2012), Meiller et al. (2011), Vezyridis et al. (2011), Çakici et al. (2011), Pedroso et al. (2009)	
Inventory Management & Control	Biswal et al. (2018), Balcik et al. (2016)	Moons et al. (2019), Mathur et al. (2018), Duan & Liao (2014), Nagurney & Nagurney (2012), Mustaffa & Potter (2009)	Mohanty & Chakravarty (2013), Dasaklis et al. (2012), Mete & Zabinsky (2010)
Service Management	Ji & Zhu (2012)	Marco & Kowalenko (2012), Samuel et al. (2010), Rahimnia & Moghadasian (2010)	Abbas & Routray (2014), Aitken et al. (2009)
Strategy Management	Hermon et al. (2019), Silva et al. (2018), Pateman et al. (2013), VanVactor (2012)	Scavarda et al. (2019), Khosravi & Izbirak (2019), Hussain et al. (2018), Syahrir et al. (2018), Khan et al. (2018), Kwon et al. (2016), Teng et al. (2014), Guimarães & Carvalho (2013)	Gupta et al. (2013), Verguet et al. (2013), John et al. (2013)

Tujuan penelitian ini adalah untuk membandingkan dengan penelitian Syahrir et al. (2015), apakah ada perkembangan dalam penelitian terkait *healthcare in disaster*. Dalam penelitian ini menggunakan 3 tema, yaitu *healthcare*, *disaster*, dan *healthcare in disaster*. Topik pada penelitian ini dikembangkan menjadi 13 topik yaitu *operation management, coordination mechanism, logistic operation, distribution, funding, scheduling, location optimization, performance, procurement, information technology, inventory management & control, service management,* dan *strategy management* seperti yang ditunjukkan pada **Tabel 1**. Syahrir et al. (2015) dalam penelitian *Healthcare in Disaster Supply Chain: Literature Review and Future Research* mengkategorikan penelitian menjadi 3 tema penelitian yaitu *healthcare*, *disaster*, dan *healthcare in disaster* dengan 5 topik penelitian (*Operation Management, Information Technology, Inventory Management and Control, Service Management*, dan *Strategy Management*) dan 5 metode penelitian (*Math. Modelling/Simulation, Case Study, Literature Review, Empirical Study,* dan *Theory/Conceptual*).

Dalam studi literatur ini terdapat penelitian yang ditambahkan ke dalam topik penelitian yang telah dikembangkan oleh Syahrir et al. (2015) sebanyak 47 penelitian. Semua penelitian yang dikaji dalam penelitian ini dapat tetap menggunakan 3 tema penelitian (*healthcare*, *disaster*, dan *healthcare in disaster*) karena penelitian membandingkan apakah topik dan metode penelitian Syahrir et al. (2015) masih relevan dengan 3 tema penelitian yang telah dikategorikan. Topik penelitian sebelumnya dikembangkan menjadi 13 topik yang dipergunakan dalam penelitian ini, yaitu: *Operation Management, Coordination Mechanism, Logistic Operation, Distribution, Funding, Scheduling, Location Optimization, Performance, Procurement, Information Technology, Inventory Management & Control, Service Management,* dan *Strategy Management*. Klasifikasi penelitian yang termasuk dalam tema penelitian dalam 13 topik penelitian dapat dilihat pada **Tabel 1**.

Metode penelitian sebelumnya dikembangkan menjadi 6 metode penelitian yang dipergunakan dalam penelitian ini yaitu *optimization*, *simulation, case study, literature review*, *empirical study,* dan *theory/conceptual*, seperti yang ditunjukkan pada **Tabel 2**.

Tabel 2. Penambahan Penelitian pada Metode Penelitian

Metode Penelitian	*Disaster*	*Healthcare*	*Healthcare in Disaster*
Optimization	Santoso et al. (2019), Li et al. (2019), Fathalikhani et al. (2019), Habibi-Kouchaksaraei et al. (2018), Noham & Tzur (2018), Boonmee et al. (2018), Cao et al. (2018), Gutierrez & Mutuc (2018), Tavana et al. (2018), Torabi et al. (2018), Fahimnia et al. (2017), Rakes et al. (2014), Davis et al. (2013), Hale & Moberg (2005)	Duan & Liao (2014)	Gupta et al. (2013), Mete & Zabinsky (2010)
Simulation	Biswal et al. (2018), Ashar et al. (2016), Ji & Zhu (2012)	Lucchese et al. (2020), Samuel et al. (2010)	
Case Study	Silva et al. (2018), Matsuo (2015), Fakhruddin & Chivakidakarn (2014), Fujimoto & Park (2014), King et al. (2014), Rivera & Wamsler (2014), Scolobig et al. (2014), Ranger & Surminskin (2013), Park et al. (2013), Becker & Tehler (2013), Kumar & Havey (2013), Lin et al. (2011), Balcik et al. (2010), Gatignon et al. (2010), Pujawan et al. (2009), Van Wassenhove (2006)	Govindan et al. (2020), Arya et al. (2015), Wei Teng et al. (2014), Chan et al. (2012), Nagurney & Nagurney (2012), Marco & Kowalenko (2012), Meiller et al. (2011), Çakici et al. (2011), Rahimnia & Moghadasian (2010), Mustaffa & Potter (2009), Pedroso et al. (2009), Kumar et al. (2008)	Verguet et al. (2013), John et al. (2013), Rachaniotis et al. (2012), Aitken et al. (2009)
Literature Review	Balcik et al. (2016), Burkart et al. (2016), Manopiniwes & Irohara (2014), Costa et al. (2012), Kovács & Spens (2007), Altay & Green (2006)	Moons et al. (2019), Mathur et al. (2018), Syahrir et al. (2018), Dobrzykowski et al. (2014), Narayana et al. (2014), Guimarães & Carvalho (2013), Beliën & Forcé (2012)	Syahrir et al. (2015), Dasaklis et al. (2012)
Empirical Study	Hermon et al. (2019), Sheu (2016), Scarpin & Silva (2014), Andersson-Sköld et al. (2013), John & Ramesh (2012)	Lu et al. (2013), Chen et al. (2013), Reyes et al. (2012), Maass & Varshney (2012), Assi et al. (2012), Vezyridis et al. (2011)	Abbas & Routray (2014), Mohanty & Chakravarty (2013)
Theory/ Conceptual	Dubey et al. (2019), Gil & McNeil (2015), Haavisto & Kovács (2015), Kabra & Ramesh (2015), Chakravarty (2014), Pateman et al. (2013), Fawcett & Fawcett (2013), VanVactor (2012), Richey (2009), Stewart et al. (2009)	Scavarda et al. (2019), Khosravi & Izbirak (2019), Hussain et al. (2018), Khan et al. (2018), Kwon et al. (2016), Gupta & Ramesh (2015)	

Tabel 3. Rekapitulasi Berdasarkan Topik Penelitian dan Metode Penelitian

		Disaster	*Healthcare*	*Healthcare in Disaster*
Topik Penelitian	*Operation Management*	16	8	2
	Coordination Mechanism	1	0	0
	Logistic Operation	5	1	0
	Distribution	1	0	0
	Funding	1	0	0
	Scheduling	1	0	0
	Location Optimization	4	1	0
	Performance	1	0	0
	Procurement	1	0	0
	Information Technology	3	10	0
	Inventory Management & Control	2	5	3
	Service Management	1	3	2
	Strategy Management	4	8	3
Metode Penelitian	*Optimization*	14	1	2
	Simulation	3	2	0
	Case Study	16	12	4
	Literature Review	6	7	2
	Empirical Study	5	6	2
	Theory/Conceptual	10	6	0

Tabel 4. Studi Kasus *Disaster* di Indonesia dalam Penelitian

Disaster	*Date*	*Author*
Erupsi Gunung Sinabung	27 Agustus 2010	Hermon et al. (2019)
Erupsi Gunung Semeru	2015	Santoso et al. (2019)
Gempa Yogyakarta	27 Mei 2006	Gatignon et al. (2010), Pujawan et al. (2009), Aitken et al. (2009)
Tanah Longsor di lereng gunung Argopuro	31 Desember 2005	Pujawan et al. (2009)
Tsunami Aceh	26 Desember 2004	Aitken et al. (2009), Wassenhove. (2006)

Tabel 3 menunjukkan rekapitulasi dari penelitian yang dianalisis berdasarkan 3 tema penelitian yaitu *disaster, healthcare,* dan *healthcare in disaster.* Terdapat 13 topik penelitian dan 6 metode yang dianalisis. Penelitian terbanyak pada kolom topik penelitian adalah tema *disaster* dengan topik *operation management* sebanyak 16 penelitian. Penelitian terbanyak pada kolom metode penelitian adalah tema *disaster* dengan metode penelitian sebanyak 16 penelitian.

Tema *healthcare in disaster* yang paling sedikit dari ketiga tema tersebut. Dalam tema *healthcare in disaster*, paling banyak ada 3 penelitian dengan topik penelitian *inventory management & control* dan *strategy management* dan 4 penelitian dengan metode penelitian berupa *case study*. Penelitian yang terkumpul pada tema *healthcare in disaster* dengan topik *inventory management* membahas terkait kontrol di *health/medical supplies*. Penelitian yang terkumpul pada topik *strategy management* membahas analisis gap dari keputusan yang diambil dan solusi potensial. Metode penelitian paling banyak digunakan adalah *case study* sebanyak 4 penelitian.

Berdasarkan hasil rekapitulasi dapat disimpulkan bahwa penelitian tema *healthcare in disaster* masih belum banyak diteliti. Tema *healthcare in disaster* dalam setiap bencana ini merupakan kebutuhan utama dalam meminimalisir terjadi korban jiwa pada pengungsi bencana. Tema penelitian ini sangat dibutuhkan untuk wilayah yang rutin terjadi bencana seperti Indonesia, yang setiap tahun mengalami berbagai bencana alam seperti erupsi gunung berapi, banjir, dan gempa bumi.

Indonesia, sebagai negara kepulauan yang dilalui oleh dua jalur aktif di dunia yaitu Lingkar Pasifik dan Mediterania. Lingkar Pasifik termasuk pulau di sekitar Sulawesi Utara dan Maluku Utara. Lingkar Mediterania dibagi menjadi dua bagian yaitu busur dalam dan busur luar (Hermon et al., 2019). Hal ini menyebabkan Indonesia sering mendapatkan bencana alam. Bencana yang biasa terjadi di Indonesia seperti banjir, erupsi, tanah longsor, gempa bumi, dan sebagainya. Hal ini menyebabkan Indonesia harus memiliki persiapan dalam penanganan bencana untuk mengurangi korban jiwa pada lokasi bencana tersebut.

Tabel 4 menunjukkan ada 5 bencana yang pernah terjadi di Indonesia berdasarkan penelitian yang dianalisis. Bencana yang sering terjadi di Indonesia dari penelitian yang terkait bencana di Indonesia adalah erupsi gunung berapi, gempa, banjir, dan tanah longsor. Erupsi dan gempa sering terjadi di Indonesia karena Indonesia berada di dua jalur aktif, yaitu Lingkar Pasifik dan Mediterania. *Healthcare* pada *disaster* pun memiliki keunikan *demand* karena terdapat perbedaan *relief* pada setiap kondisi bencana. Sebagai contoh bencana erupsi memiliki kebutuhan untuk infeksi saluran pernapasan (ISPA) karena ada potensi korban bencana menghirup abu vulkanik, tetapi pada bencana gempa bumi memiliki kebutuhan untuk operasi bedah karena ada potensi korban bencana mengalami patah tulang.

Dari penelitian terkait *healthcare in disaster*, terdapat penelitian pengembangan model *Rescue Unit*, model mitigasi bencana, desentralisasi SC dalam bencana, dan *DRO SC*. Tetapi tidak banyak penelitian yang membahas tenaga kesehatan dalam *healthcare* SC saat terjadi bencana, padahal bantuan tenaga kesehatan sangat dibutuhkan pada 3 x 24 jam bencana terjadi, terutama pada bencana yang sulit diprediksi seperti erupsi gunung berapi dan gempa bumi.

4. Kesimpulan

SC dalam *healthcare in disaster* berpengaruh dalam mengirim *relief* dan tenaga medis. SC dalam *healthcare in disaster* memiliki situasi darurat, sehingga kebutuhan lebih susah diprediksi jika dibandingkan SC pada umumnya yang lebih mudah diprediksi. Hal ini menyebabkan respon untuk kebutuhan *healthcare in disaster* SC harus cepat. Dalam studi literatur ini, didapatkan bahwa sudah ada penelitian yang membahas *healthcare in disaster* SC terkait *relief, shelter*, dan tenaga medis. Penelitian yang ada terkait *relief* adalah penelitian seperti distribusi *relief* dan jenis *relief*. Dalam penelitian *healthcare* SC terkait tenaga medis tidak banyak penelitian yang membahas dalam kondisi *disaster operation*, khususnya saat terjadi bencana erupsi gunung berapi karena Indonesia berlokasi di dua jalur aktif, sehingga Indonesia akan sering terjadi bencana terkait gunung berapi.

Penelitian selanjutnya dapat dilakukan dengan membuat model penjadwalan tenaga medis dalam kondisi erupsi gunung berapi di Indonesia. Indonesia terletak pada Cincin Api Pasifik sehingga gunung berapi tersebut memiliki status aktif dan memungkinkan erupsi setiap saat. Hal ini membuat pengembangan model penjadwalan tenaga kesehatan tersebut dibutuhkan dalam membantu tenaga kesehatan untuk menangani korban erupsi gunung berapi di Indonesia sehingga jumlah korban bencana dapat diminimalisir.

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