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Finnish Chief Nursing Officers' and Regional Managers'  
Observations on Environmental Responsibility  
in Health Care  
– The need for systemic change

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**Asiasanat:** Systeminen muutos, ympäristövastuullisuus, terveydenhuolto, hyvinvointialue

Ilmastonmuutos ja saasteet ovat yksiä suurimpia terveysuhkia maailmassa. Terveydenhuollolla on isona toimialana osuus ilmastonmuutoksessa. Suomessa sosiaali- ja terveydenhuollon osuus kansallisesta hiilijalanjäljestä on 6,5 %. Terveydenhuollon ilmastoalanjäljen lähteitä ovat kasvihuonekaasupäästöt energiankulutuksesta, toimituksista sekä tuotteiden valmistuksesta, käytöstä ja niiden hävittämisestä.

Tämän tutkimuksen tarkoituksena oli kuvata terveydenhuollon ympäristövastuullisuutta systemisestä näkökulmasta. Tarkoituksena oli myös tuottaa tietoa, jota voidaan käyttää kehittämään ympäristövastuullisuutta terveydenhuollossa. Esihenkilöt jäsentävät ja koordinoivat organisaatioiden resursseja, joten haastatteluihin valittiin terveydenhuollon esihenkilöitä.

Tutkimusaineisto kerättiin osastonhoitajalta, ylihoitajilta ja alue-esihenkilöiltä (n=10) teemahaastatteluina keväällä 2023. Haastatteluaineisto analysoitiin induktiivisella sisällönanalyysillä.

Haastatellut kuvasivat terveydenhuollon ympäristövastuullisuuden tekijöitä mikro-, meso- ja makrotasolla. Mikrotasolla haastatellut kuvasivat ympäristöarvoja ja ympäristön kannalta kestäviä toimia omassa elämässään. Henkilökunta kuvattiin varovaiseksi muutoksien suhteen, joten terveydenhuollon esihenkilön tuli olla johtamisessaan aktiivinen ja rohkaiseva.

Mesotasolla tekijät ympäristövastuullisuuden liittyivät terveydenhuollon toimintatapoihin. Turvallisuus ja potilaat olivat prioriteetteja terveydenhuollossa. Organisaatioiden strategioissa ei ollut ympäristöohjausta tai ympäristökoulutusta. Terveydenhuollon yksiköt käyttivät paljon energiaa ja tuottivat paljon päästöjä ja jätettä, josta ei kaikkea voitu lajitella tai kierrättää. Hyvinvointialueella oli tiukka taloustilanne, jolloin prioriteettina olivat säästöt. Hyvien toimintatapojen integrointi oli hyvinvointialueella vielä työn alla. Oma roolinsa ympäristövastuullisuudessa oli eri yhteistyötahoilla hankintayksiköistä terveydenhuollon tuotteiden tuottajiin. Terveydenhuollon ammattilaisten koulutuspaikkojen toivottiin ottavan ympäristökoulutukset osaksi opetussuunnitelmia.

Makrotasolla haastatellut kuvasivat tarvetta kansallisella ohjauksella ministeriötasolta. Lainsäädännölliset velvoitteet säästöille aiheuttivat lisääntyntä kertakäyttötuotteiden hankintaa ja tätä kautta ympäristökuormaa. Covid-19 ja Venäjän-Ukrainan sota olivat johtaneet vaikeuksiin tuotteiden ja komponenttien saatavuudessa, jolloin ei ympäristönäkökulmaa voitu huomioida.

Haastatteluista rakentui terveydenhuollon ympäristövastuullisuuden systeeminen rakenne. Systeeminen näkökulma muutokseen oli tarpeen koko terveydenhuollon systeemin muuttamiseksi. Pienet purot ja yksittäisetkin toimet mahdollistivat muutoksen implementointia.

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Department of Nursing Science

Nursing Science: Preventive Nursing Science

Ampuja, Tiina: Finnish Chief Nursing Officers' and Regional Managers' Observations on Environmental Responsibility in Health Care – The need for systemic change

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**Key words:** Systemic change, Environmental responsibility, Health care, Wellbeing services county

Climate change and pollution are one of the biggest threats to health in the world. As a large industry, health care has a role in climate change. In Finland health and social care accounts for 6.5% of the national carbon footprint. The sources of health care's climate footprint are greenhouse gas emissions from energy consumption, shipping, agriculture and food, pharmaceuticals and anesthetic gases, chemicals, product manufacture, use, and waste treatment.

The purpose of this study was to describe health care's environmental responsibility from a systemic perspective. The aim was to provide information that can be used to develop environmental responsibility in the health care system. Managers structure and coordinate the resources of organisations, therefore health care managers were selected for the interviews.

The research material was collected from a nurse manager, chief nursing officers and regional managers (n=10) in interviews in the spring of 2023. The interview material was analyzed using inductive content analysis.

The informants described factors in environmental responsibility in health care in micro, - meso- and macro-levels. On micro-level, the informants had environmental values and practiced

environmental actions in their personal lives. The personnel were described as cautious to change and the health care managers needed to be active leaders and encourage and motivate the staff.

The meso-level factors related to the methods of operation of health care, with prioritizing safety and patients. The strategies of organisations were described lacking environmental guidelines and environmental education and training. The health care facilities used a lot of energy and produced a lot of emissions and waste, of which not all was sorted and recycled. Financial discipline was prioritized at the wellbeing service county, and integration of good practices was still in process. The different stakeholders from the procurement unit to the manufacturers had their own part in health care's environmental responsibility. Informants hoped that the previous education of the health care personnel would implement environmental training in their curriculums.

On macro-level, informants described the need for national guidance and direction from the key ministries. The finances had a toll related to the environmental aspects as more single-use items were procured because of legislative obligations to economize. Global crises from COVID-19 to the ongoing Russo-Ukrainian war had buried environmental matters as there were issues with different supplies and components.

The systemic structure of environmental responsibility in health care was described by the informants. The systemic approach was needed for the whole system to change. The little streams and little actions were ways to implement change in the whole system.

## Abbreviations

CER	Corporate environmental responsibility
CNO	Chief nursing officer
COP26	United Nations Climate Change Conference in Glasgow in 2021
EBP	Evidence-based-practice/s
ER	Environmental responsibility, environmentally responsible
IPAC	Infection prevention and control
MO	Modus operandi, method of operating
PPE	Personal Protective Equipment
RtC	Resistance to change
WSC	Wellbeing services county
X	A symbol hiding personal information

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## 1 Introduction

The environment is a key concept for nursing science. Nursing predecessors Rufaida al-Aslamiya and Florence Nightingale both included the environment as part of nursing's domain. As patients', clients' and nurses' environments are changing and under threat, nursing research needs to expand. (Meleis, 2018) WHO (2019) names climate change and pollution as the biggest threats to health in the world and Sitra (2023) lists ecological sustainability crisis in its Megatrends 2023. In Finland, health and social care accounts for 6.5% of the national carbon footprint (Pulkki et al., 2023). The sources of health care's climate footprint are greenhouse gas emissions energy consumption, shipping, agriculture and food, pharmaceuticals and anaesthetic gases, chemicals, product manufacture, use, and waste treatment. The biggest source for emissions, 71%, are largely resulting from the health care supply chain through, for example the production, transport, and disposal of goods and services, such as medical devices or hospital equipment. (Health Care Without Harm, 2019.)

Environmental issues are called wicked problems (Whyte & Thompson, 2012), because of their nature of needing multidisciplinary, interdisciplinary, top-down and bottom-up approaches to solve. Climate change is not only an environmental crisis but also a health crisis. Recent studies find that the exposure to fine particulate matter pollution is associated with increased morbidity and mortality across the lifespan (Vodonos & Schwartz, 2021; Zhang et al., 2018).

Tackling climate change demands a systemic change. Midwives and nurses account for approximately 50% of the global health workforce (WHO, 2022) and nurses' environmental responsibility (ER) has been studied in prior years, to some extent. Studies have identified organisational support and visible environmental responsibility from the management (Dunphy, 2014; Kallio et al., 2020) as factors that promote environmental responsibility in health care setting. Chief nursing officers (CNOs) observations on environmental responsibility have not been studied yet.

In Finland, municipality's organisational environmental responsibility encompasses all its divisions including health care division. The responsibility is stated in Local Government Act (410/2015, 1 §): "Municipalities shall advance the well-being of their residents and the vitality of

their respective areas, and shall arrange services for their residents in a way that is financially, socially and environmentally sustainable.” It has been noted that the practical implementation of sustainability strategies is often weaker than initially planned in municipalities. The governance of municipalities and organisations can be characterized by divisional structures, thus attention should be paid to the cross administrative nature of activities and cooperation between stakeholders. (Kettunen et al., 2019). Transitioning the health system toward decarbonization and climate resilience is critical. Health care is a big system inside even bigger systems indicating the systems approach as the preferable choice. The recent statement from EKO-SOTE project (Pulkki et al., 2023) suggests including the goal for carbon neutral health and social services by 2035 in the national strategic guidance and direction of health and social services, the formation of a national network coordinated by the Ministry of social affairs and health, and project funding targeted at the topic.

Sustainable development concept was defined by the Brundtland Commission in 1987, as development that satisfies the needs of the present population without jeopardizing the ability of future generations to satisfy their own needs. Environmental, social, and economic sustainability were established as the three dimensions of sustainable development in the 1992 Earth Summit in Rio de Janeiro (United Nations [UN], n.d.). Environmental responsibility is often related to corporate environmental responsibility (CER) that means recognising and managing the impacts of a company's activities on nature, the climate, human health and living conditions (Suomi.fi, n.d.). The concepts of environmental sustainability and environmental responsibility are sometimes used in parallel. In this research environmental responsibility (ER) means understanding that the environment is the health care system's responsibility and recognizing health care's impacts on the environment.

In this research systemic change indicates simultaneous transformation of operational models, structures, and their interactions, which are used to create the prerequisites for future welfare and sustainable development (Sitra n.d.) in health care. Health care represents the work done in health care facilities (ward services and health and social services centres and specialised healthcare) in the wellbeing services county (WSC) of North Savo. The WSC is a public-law entity

separate from the municipalities and the state and has self-government in its area. The WSC organizes the tasks stipulated for it by Act on Wellbeing Services Counties (611/2021). The statutory duties of the WSC include the organisation of social and health care and rescue services.

The purpose of this study is to explore health care's environmental responsibility in systemic perspective. The aim is to provide information that can be used to develop the environmental responsibility in the health care system. The research was carried out in the form of thematic interviews and inductive content analysis was used.

## 2 Environmental responsibility in health care

Health care's role in climate change has been noted. At the UN climate conference, COP26, 45 million health professionals signed a letter encouraging the governments to take stronger actions against climate change, and 54 health institutions committed to achieving net zero emissions (WHO, 2021). The purpose of the literature review was to find background and significance to environmental responsibility in health care, with a focus on human health care, not veterinary health care. Another focus was the personnel (Grove et al. 2013). Used databases were CINAHL, Pubmed, SocINDEX and Scopus.

### 2.1 Literature review process on environmental responsibility in health care

Database searches were done on environmental responsibility with a focus on leadership positions (chief nursing officer, chief nursing executive) using key concepts: chief nursing officer, chief nursing executive and environmental responsibility. Another search was done using key concepts nurse leadership, nurse management and environmental responsibility, and another one with nurse leadership, nurse manag\* and environmental responsib\*. These searches did not yield any results. Inclusion criteria were: academical research article, peer reviewed, in English or Finnish, published after 1.1.2013, targeting chief nursing officers with objective results.

Additional searches were then done (Table 1, page 14) with the search query used in (with limitations to years 2010-2021) in 2021. These new searches were limited to years 2021-2023. Inclusion criteria were: academical research article, primary source, peer reviewed, in English or Finnish, published after 1.1.2021, targeting health personnel, available full text, with objective results. The criteria for the exclusion were: target group outside health care, news, columns or editorials, articles without peer reviewing, language other than Finnish or English, no full text available and published before 2021.

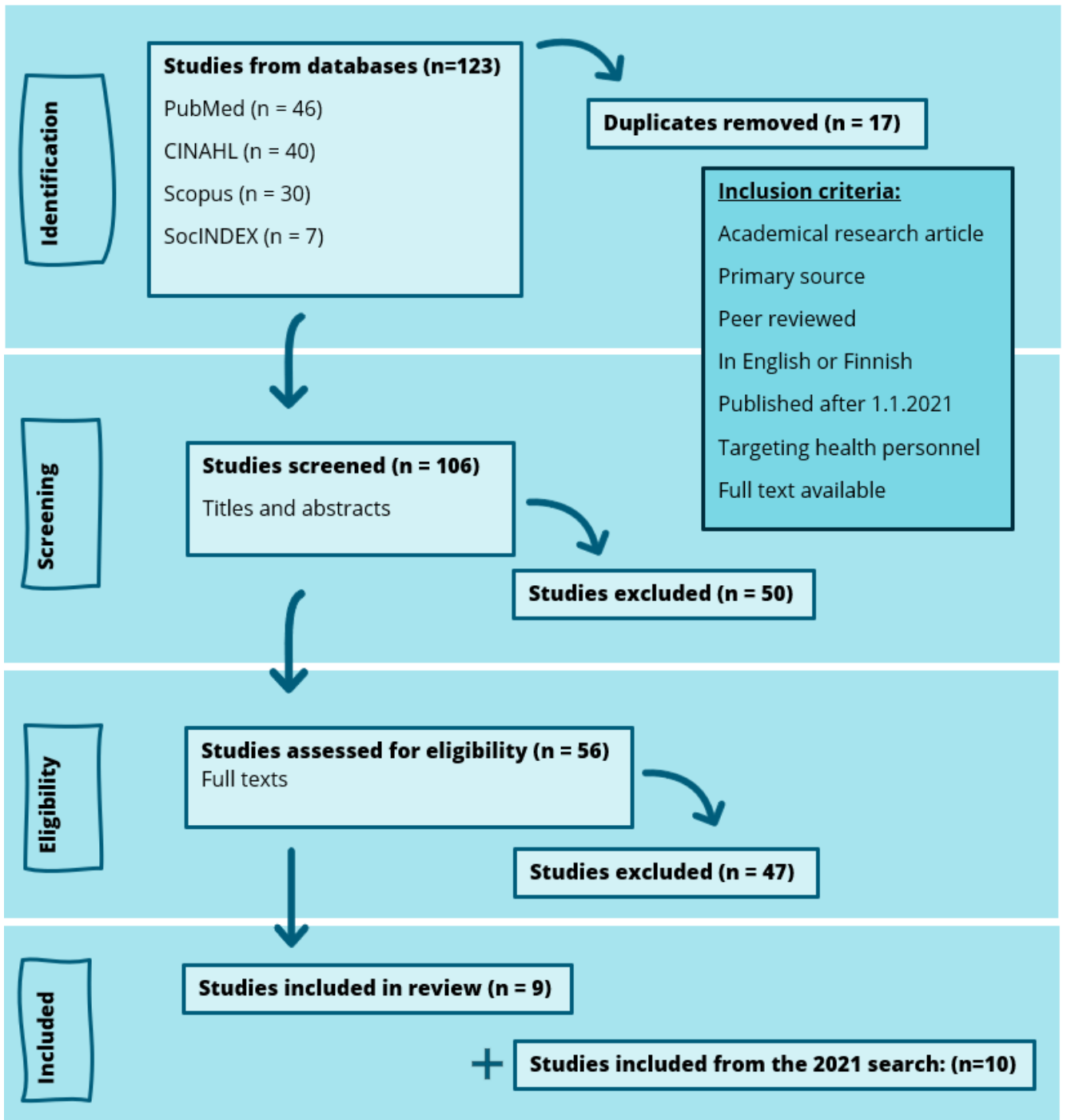
**Table 1.** Literature search on nurses and health personnel and environmental responsibility

Database	Keywords	Limitations	Results	Selected
CINAHL	nurse OR nurses OR nursing OR "nursing staff" OR "health personnel" AND "environmental responsibility" or "environmental sustainability" NOT students	year 2021-2023	40	3
PubMed	((nurse OR nurses OR nursing OR "nursing staff" OR "health personnel") AND (" environmental responsibility" or "environmental sustainability")) NOT (students	year 2021-2023	46	3
Scopus	( TITLE-ABS-KEY ( nurse OR nurses OR nursing OR "nursing AND staff" OR "health AND personnel" ) AND TITLE-ABS-KEY ( " AND environmental AND responsibility" OR "environmental AND sustainability" ) AND NOT TITLE-ABS-KEY ( students ) ) AND PUBYEAR > 2009	year 2021-2023	30	2
SocINDEX	nurse OR nurses OR nursing OR "nursing staff" OR "health personnel" AND " environmental responsibility" or "environmental sustainability" NOT students	year 2021-2023	7	1
Total			123	9

The literature from the search query with the new searches (2021-2023) were then screened with the screening and data extraction tool Covidence. After 17 duplicates were removed, a total of 106 studies went through the title and abstract screening (Picture 1, page 16). 50 studies were reviewed as irrelevant in title and abstract screening. 56 studies went through full text review and 47 were excluded. Researchers of one promising study were contacted because the full text was not available. They never replied to the research request in the ResearchGate networking site. The selected research literature from the literature review in 2021 and from this new review was then assessed using Joanna Briggs Institute's (JBI,2020) critical appraisal tools. Cut off point was 60% of the maximum appraisal points. Focus on the assessment was also on the result relevance of the research literature for this study. 19 articles were included in the review (Table 4, Appendix 1). The studies were done in the United Kingdom (n=6), Australia (n=4), Canada (n=2), the Unites States of America (n=2), Finland (n=1), France (n=1), India (n=1), Netherlands (n=1),

New Zealand (n=1), South Africa (n=1) and Sweden (n=1), Two studies were done in two locations.

The studies included interview studies (n=11) with sample sizes from n=5 to n=64. The study from Nichols and Mukonoweshuro (2017) interviewed five key informants from one neonatal unit. Generalization is not possible with a sample size like this. One study used the Delphi method (Kallio et al., 2020) and one used the content analysis on specific documents (Mundie & Donelle, 2022). Three studies used focus groups. Studies using statistical analysis had sample sizes from n=70 to n=1092. The mean of the sample sizes from those studies was 275 and the median 116. The only study from South Asia, the study from Chaudhary and Kumar (2021), surveyed health personnel in the Bihar state in India. Most studies were done in Europe, (n=10). Comparing research findings with studies done in different health care settings requires critical thinking. Climate change is a global problem, and it has consequences to the whole population. Having background literature from studies done outside of Europe gives a wider perspective on the issues, as global warming threatens the poorest countries with the greatest local climate changes (King & Harrington, 2018).



Picture 1. Flow diagram on literature search process



## **2.2 Health personnel and environmental responsibility**

Managers consciously structure and coordinate organisational resources (Daft, 2009), thus the literature review focused management level and organisational factors in environmental responsibility in health care. The factors were methods of operation (MO), organisation, management, cooperation, resources, and work environment.

### **2.2.1 Methods of operation (MO) of health care**

Evidence-based practices and preventive health care have been reported as environmentally responsible methods. Disease prevention and health promotion, for example by supporting health behaviour, would reduce the need for treatment whilst supporting sustainable development. Evidence-based practices would reduce patients' risk without additional consumption of natural resources. (Anåker et al., 2015; Naylor & Appleby, 2013)

Nurses have stated that the health care prioritizes the economy over the environment (Anåker et al., 2015). Professional paradigms were perceived as too narrow and rigid, creating a barrier to environmentally responsible healthcare, and the health care function was perceived as reactive. The reactivity of health care was seen as having the focus on crisis management and insufficient consideration of future needs. (Anåker et al., 2015; Dunphy, 2013)

Health care was reported to focus on more easily measurable results and the operating methods lacked a way to measure sustainable development on a large scale, which was a particular obstacle to environmental responsibility. Furthermore, ER was not a clear concept in health care's context. (Dunphy, 2013, 2014; Naylor & Appleby, 2013)

### **2.2.2 Organisation's role in environmental responsibility**

Health care organisations' corporate plans and mission statements were often lacking references, objectives and strategy toward sustainability (Dunphy, 2013; Talbot et al., 2022). In Canada (Mundie & Donelle, 2022) the policies of nursing organisations and regulatory bodies

described language of engagement and nursing profession as well positioned to increase environmental health awareness in many levels of the society. Focus on finances was problematic and 'Payment by Results'- systems created motivations for increased, at times redundant, appointments. (Naylor & Appleby, 2013) Organisations were more inclined to environmental sustainability innovations if the innovations were manageable and simple, supported testing and there was return on investment (Chaudhary & Kumar, 2021). Implementation of sustainable practices was thwarted by poor environmental awareness on all levels (Tordjman et al., 2022).

### **2.2.3 Management's role in environmental responsibility**

The role of the environmental officer in the workplace was described as a background factor of environmental responsibility and made the personnel commit to acting for the environment (Terry et al., 2019). Organisations supported sustainable development by including it in their plans, and visible environmental communication and environmental responsibility on the part of management were perceived as important (Dunphy, 2014; Kallio et al., 2020). Management needed to recommend ER decisions and possible changes to existing actions. It was important to make a note of possible waning staff engagement and continuously reinforce the ER practices. (Pavli et al., 2023) Giving feedback and rewarding the staff for their progress were important factors in motivating and maintaining interest in ER activities and their development (Kallio et al., 2020). Educating the personnel on ER and raising awareness on risks from health care specific factors that cause environmental burden, like specific anaesthesia gasses, is key (Kelly et al., 2023; Tordjman et al., 2022).

To achieve environmental responsibility, the need was presented for a change in the management processes, which would be manifested by adding environmental responsibility to the management metrics (KPI, key performance indicator). This would ensure that management level would transfer ER down the line. (Dunphy, 2013) In the most successful organisations, ER was given to individuals and teams, improvisation and experimentation were allowed, and conditions were created for an everyday learning culture. This kind of enabling was not always found, in which case the lack of organisational support prevented the creation of environmentally

responsible conditions. (Naylor & Appleby, 2013) Successful sustainability initiatives were reported having reliable leadership and “Lean” training (Yu & Baharmand, 2021).

#### **2.2.4 Cooperation and environmental responsibility**

Multi-professional and interdisciplinary collaboration, and improving communication across sectors were felt to break down barriers to ER (Dunphy, 2013; Mundie & Donelle, 2022). For reducing carbon emissions and waste, multi-disciplinary teams were an important factor (Sijm-Eeken et al., 2023) and the entire staff had to commit to cooperation (Kallio et al., 2020). The nurses presented collegiality and professional cooperation as a factor promoting environmental responsibility, because with the help of like-minded colleagues, ER was easier (Terry et al., 2019). Partners like procurement were sometimes seen operating tokenistic practices, and not really actively managing the processes in a sustainable way (Naylor & Appleby, 2013; Talbot et al., 2022).

Environmentally aware nurses faced bullying from some of their colleagues at the workplace. Non-collegiality and direct bullying of the nurse responsible for the environment manifested itself as, for example, joking and eye-rolling. To protect relationships with their colleagues, nurses needed to suppress their emotions on environmental issues. It was difficult to get colleagues to maintain environmentally responsible practices and the work culture did not support environmentally responsible activities (Dunphy, 2013; Terry et al., 2019; Terry & Bowman, 2020).

#### **2.2.5 Resources and environmental responsibility**

Overuse and underuse of resources should be avoided. In intensive care, satisficing, achieving high-quality care within the limits of the available resources, was found to be an essential method for making sustainable development possible. (Baid et al., 2019). In Kallio et al.'s (2020) study, nurses agreed that environmental responsibility required resources and sufficient personnel. Pressuring fiscal budgets have been linked to sustainability efforts, and economic rationalisations at the workplace surpassed even strong personal environmental values. The mismatch between personal values, such as respect for the environment, and the responsibilities in health

care was reported in many studies. (Baid et al., 2019; Dunphy, 2014; Terry & Bowman, 2020; Tor-djman et al., 2022)

Improving efficiency reduced the unnecessary use of resources and, for example, the reduction in the amount of waste was directly reflected in costs and the environment (Naylor & Appleby, 2013). ER initiatives with concomitant benefits, like decreased cost, were more likely to be implemented by organisations (Pavli et al., 2023). Financial constraints appeared as an obstacle to ER, and it was seen as short-term planning. Financial pressure was experienced in the use of re-sources, knowing the limitations of the budgets (Baid et al., 2019; Naylor & Appleby, 2013). Limited resources were reported in several studies as an obstacle to environmental responsibility (Dunphy, 2013; Lister et al., 2022; Polivka et al., 2012) and the current model of resource use was described to be ecologically, economically and socially unsustainable (Baid et al., 2019).

The lack of resources and time constraints were obstacles to ER activities, because the focus was on the patient, disease prevention and hygiene measures instead of the environmental perspective (Anåker et al., 2015; Baid et al., 2019; Nichols & Mukonoweshuro, 2017). In a hurry and tired, a nurse could equip themselves with unnecessary supplies or waste products due to their wrong decisions. Reducing quotas of disposable equipment was found to reduce waste and supply costs. Additionally, restricting infection prevention and control (IPAC) policies were a barrier to reusing unused supplies from patient rooms. IPAC protocols produced large amount of possible avoidable physical waste, but hygiene and safety measures were often reported as a primary responsibility over the environment. (Anåker et al., 2015; Baid et al., 2019; Yu & Baharmand, 2021) The shortage of personnel challenged recommendations for high-quality care as well as ER operations (Baid et al., 2019).

## **2.2.6 Work environment and environmental responsibility**

Both commuting, waste and patient transportation were mentioned as possible targets for reducing environmental impacts, and it was suggested to encourage the staff to commute by bicycle. Secure parking for the bicycles and facilities for showering and changing were needed. Replacing patient transport and staff transport with remote receptions and telephone services

were also mentioned as ways to avoid unnecessary travel and discharges. (Kallio et al., 2020; Naylor & Appleby, 2013; Talbot et al., 2022)

Waste sorting, recycling and reuse, and heating systems were reported as part of functional health care facilities (Naylor & Appleby, 2013). The facilities required high-quality and durable equipment. (Kallio et al. 2020). Recycling of non-medical equipment was noted as a common action taken toward sustainability (Yu & Baharmand, 2021). Recycling issues rose from difficulty of maintaining sustainable practices (Terry & Bowman, 2020) and challenges in sufficient room for the waste sorting. The clinical environment was not perceived to be functional in terms of sustainable development, especially due to the lack of space at the place of waste generation and, for example, waste sorting was perceived as intrusive in the treatment environment. (Nichols & Mukonoweshuro, 2017). Health personnel were not educated on optimal waste management (Talbot et al., 2022), but wanted to improve sorting in their units (Tordjman et al., 2022). Health care facilities' building infrastructure and energy use was noted, but for example motion-sensor lights were not commonly in place, and the personnel did not have knowledge if renewable energy was used in their facilities (Talbot et al., 2022).

### **2.2.7 Summary of the review**

Factors in ER in health care cover the entire system and require systemic change. Methods of operation (MO) showed the difficulty of the ER concept in health care's context. Organisations needed plans, mission statements, objectives, and strategy toward sustainability. Management and active leadership had a big role in the creation of environmentally responsible conditions. Cooperation meant multi-professional and interdisciplinary collaboration, and positive work culture. Finances were often as a barrier, even though there were concomitant benefits with ER, like decreased cost. Work environment in health care and the clinical setting, were challenging, but the personnel were motivated to improve ER, for example, in the form of environmental training.

### **3 Purpose, aim and research questions**

The purpose of this study is to explore health care's environmental responsibility in systemic perspective. The aim is to provide information that can be used to develop the environmental responsibility in the health care system.

Research questions

1. What role does health care have when deciding on environmental policy?
2. What are the barriers for environmental responsible health care?
3. What are the strategies to overcome the barriers and implement change?

## 4 Methodology

A qualitative exploratory-descriptive research design was chosen to gather a full understanding of the informants' views on environmental responsibility. These types of qualitative studies address issues that need solutions like climate change in this research's framework. (Grove et al., 2013) Informants' connection to nursing management and the hypothetically significant structure of the phenomena that environmental responsibility in health care is, was known to the researcher. On the basis on the analysis done, an interview guide was formed, and the focus was on the subjective experiences of the informants. (Merton & Kendall, 1946) Inductive qualitative content analysis was chosen, because prior knowledge of environmental responsibility in health care was fragmented and multidisciplinary (Kyngäs et al., 2020).

### 4.1 Research design, sampling, and recruitment

The research was carried out in the form of thematic interviews (focused interviews) (Appendix 2). Informants were recruited using purposive sampling. This was done to attain rich variation in the data as the informants represented a geographically large area. Initial connections in the recruitment process came from a contact person from the Faculty of Health Sciences in University of Eastern Finland. Contact information for the possible informants were then given by a contact person in the Kuopio University Hospital. Chief nursing officers and regional managers of general services in the service structure were contacted via email (Appendix 3). It included managers from ward services and health and social services centres and specialised healthcare. These services were chosen because they represented the hospital like health care facilities in the WSC of North Savo. Snowball sampling was a possibility, and some of the contacted managers did send the email further to nurse managers working in their units. One informant was attained through the snowball sampling. (Grove et al., 2013) Originally the intention was also to interview the WSC of North Savo's procurement unit's personnel, but none were reached. All individuals who wanted to participate were included, until saturation was met. The informants were chief nursing officers, a nurse manager, and regional managers of the wellbeing services county of North Savo. Ten chief nursing officers, nurse managers and regional managers, all women (n=10), participated in the study. Background information was asked on gender: male / female / other /

wish not to tell, duration of employment in a management position in years, and educational background (Table 3, page 27). All informants were autonomous individuals and capable of giving an informed consent to participate in the study. The sample size was defined according to the scope of the thesis and samples of similar size have been determined appropriate for qualitative interview study designs. (Guest et al. 2006). All interviews were conducted in Finnish with the possibility of using English given to the informants.

## 4.2 Data collection

The data collection was conducted from April-June 2023 in Finland. The interviews aimed at descriptive information on environmental responsibility in health care through themes, considering human interpretations of things and their meanings, especially in interaction. The list of topics focused the discussion on those key topics. All informants were aware that the interviews were electronically recorded and gave informed consent. Preliminary interview was done to test the themes and hypothetical questions and was included in the final data. (Hirsjärvi & Hurme 2008) All informants were informed about the right to self-determination: the participation in the study was voluntary, and they had the right to withdraw their participation in the study at any time without penalty (Grove et al., 2013). Interviews were done using video conference software Microsoft TEAMS. For every informant, the reserved interview time was 60 minutes. The interviews lasted between 38 minutes and 63 minutes and were recorded in an audio file and transcribed via TEAMS live transcription in Finnish. The transcripts were then carefully read through while listening to the audio files, manually correcting possible mistakes in the transcripts, and adding punctuation marks for laughter and other nuances. The final transcripts were 275 pages in total, with font size 12 and line spacing 1,5. Coding the informants into codes (M1-M10) protected the anonymity of the informants in the finished report.



### 4.3 Data analysis

Transcripts were read multiple times and audio recordings were listened to, to become familiar with the data. Data were analysed using inductive qualitative content analysis (Table 2, page 26). Exploring the phenomenon through coding was done only after extensive time with the raw data. Sentence/s were chosen as a unit of analysis. For the content analysis, the three research questions: What role does health care have when deciding on environmental policy?; What are the barriers for environmental responsible health care? And what are the strategies to overcome the barriers and implement change, were on display.

The manifest content was coded from all the interviews with the computer assisted qualitative data analysis software NVivo. The latent content was observed, but not coded. Formed open codes were then compared to find differences and similarities between them, for possible merging. Initially the codes surprised the researcher with broad view and complexity, but the coding revealed a good correspondence of the material in relation to the research questions, and systemic structure and complexity of the phenomenon. Coding process included knowledge of the phenomenon and a certain amount of intuition. Ultimately 45 codes were formed in data abstraction. The process continued to form sub- and main categories. (Grove et al., 2013, Kyngäs et al., 2020) Using inductive qualitative content analysis, one main theme, three main categories and ten sub-categories were formed.

**Table 2.** Example on the process of inductive content analysis in this study

Meaning unit	Condensed meaning unit	Code	Sub-category	Main category	MAIN THEME
"Of course, as a person in charge, I then started to organize and ask the people in charge of property maintenance, on how to get waste sorting in the offices and break rooms." M4	Taking responsibility for issues that arise.	Active leadership	Manager	Micro-level factors	Systemic structure of environmental responsibility in health care
"Of course, there is acting by example and how I lead. It definitely matters." M8	Leading by example.				
"That in a way we try to save on everything else there, except for the personnel, which is like the absolute necessity." M5	Financial savings are the most important now.	Financial discipline	Wellbeing services county	Meso-level factors	
"..procurements are made on the basis of a really tough competitive tendering it may be that, for example, single-use products are chosen just for the sake of the money." M4	Financial situation is challenging in the wellbeing services county.				
"Since a lot of things are based on some Ministry of social affairs and health instructions or something else, why wouldn't the instructions to take care of the environment come from there?" M5	Ministry of social affairs and health needs to lead environmental responsibility in health care.	National guidance and direction.	Policy	Macro-level factors	
"In my opinion people in civil service cannot create that strategy alone, but it must be done strongly in cooperation with the political decision-making." M1	WSCs working together with minister level decision making.				

## 5 Results

This study describes the managers' (a nurse manager, CNOs and regional managers) observations of environmental responsibility in health care. Informants gave a rich variation of data in the interviews. Factors in environmental responsibility in health care were found in micro, - meso- and macro- levels and had a systemic structure. The research results are described in detail in this section in figures containing main and subcategories. The informants' direct quotations were originally in Finnish. They were translated to English with a focus on maintaining the integrity of the original quotations.

**Table 3.** Background information on informants (n)

<b>Gender</b>	<b>n</b>
Female	10
Male	0
Other	0
Wish not to tell	0
<b>Highest degree</b>	<b>n</b>
Doctorate	2
Master's degree	7
Bachelor's degree	1
<b>Years in management position</b>	<b>n</b>
5–10 years	2
11–19 years	5
20 and more years	3

## 5.1 Micro-level factors in environmental responsibility in health care

Micro-level factors related to the manager and the personnel (Figure 1, page 30). Factors related to the managers themselves were the values that were the basis of ER and environmental actions in their private life, which were shown in many ways like recycling or buying local produce. Factors were also the active leadership and the monitoring of the goods used. Personnel related factors were their values and their cautiousness towards change.

### 5.1.1 Factors related to the managers themselves

Most informants expressed having **environmental values** and **practising environmental actions** in their private life. Environmental values were core values, that were reflected in environmental actions. Those actions were seen as something to do in everyday activities. Informants described how they recycled as much as they could, tracked their carbon footprint, and bought locally produced produce and used products. Some informants picked up litter while walking in nature.

“It is quite high in my own world of values, environmental responsibility.” M8

“And of course, in many of your own personal choices, you also try to take into account whether this is environmentally friendly and whether it is somehow locally produced and, and so on, and logistics-related things in your own life, and I recycle a lot of things and also buy used, which I think is the consideration of the environment.” M7

**The goods used needed to be monitored**, to be able to react to it if, for example, excess use is seen. Informants described monitoring and measuring waste as means to get intermediate objectives and successes from achieving them. **Active leadership** was described as encouragement and motivating and acting as a coach to the personnel. Managers needed to lead by example and be sensitive to staff suggestions, like added waste sorting, and be responsible for the

implementation of those ideas. Some informants planned to take ER into account in the next recruitment.

“Since health care uses a huge amount of, for example, various medical supplies, so the monitoring and monitoring of their use... is this something temporary or is this something about the operating culture or operating methods.” M4

“After all, it's like a core task in leadership that you kind of get your own team involved and get them motivated and encouraged, and you work with them like a coach.” M1

“To bring up from time to time and so on, and to encourage the fact that in our everyday activity (at the health care unit) we would also think about the environmental issues.” M8

“Now that I think about my own role, that I will try to remember the next time I'm recruiting..that the person would have, for example, minor studies in such a way that they would be able to look at our operations from that (ER) point of view.” M9

### 5.1.2 Factors related to the personnel

Informants described that health care personnel can be **cautious to change**. This was seen as challenge that required time. New health care buildings had multi-space environments and even though the utilization of space was calculated, the new environment was unpleasant for some of the personnel. **The values of the personnel** supported the management. The personnel with environmental values were seen as possible change agents.

“Of course there are always those (in the personnel) who are wary of change, those who have been doing a certain thing the same way for the last 30 years, so it won't change in an instant. M2

“We really don't have that much useless square footage here (in the new building), so maybe that's how it works, of course, the old operating models sit tight, so it has been a pain to some.”M3

“It's this young and enthusiastic personnel who already has a certain kind of attitude towards it, like for example recycling or waste treatment and all that sort of thing.”M4

“Fortunately our employees are also active and they also want to bring up similar issues (pressing issues like climate change).” M1

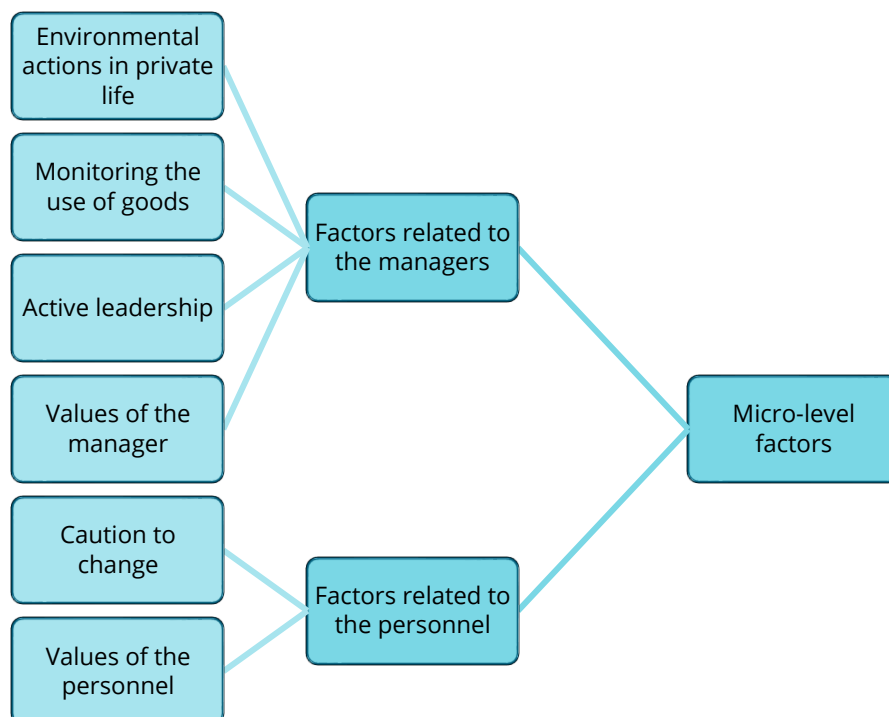


Figure 1. Micro-level factors in environmentally responsible health care

## 5.2 Meso-level factors in environmental responsibility in health care

Informants described diverse factors at the meso-level, relating to the MO of health care, the strategy of organisations, the health care facilities, the wellbeing service county, and the different stakeholders (Figure 2, page 44).

### 5.2.1 MO of health care

Safety was highly prioritized in health care. Informants explained how **patient safety and personnel safety** were matters not to compromise on. The possible environmental impacts could not always be the aim. The safety of patients was also related to possible threats from the local environment, accident risks brought on by industry and production, or the emissions of different industries. Focusing on customer care and the health of the population meant **prioritizing the patients**. Public health work was described as **preventive health care**, which was in key positions in relation to people's well-being and also costs.

“For the procurement of the X unit, the issue is there you have to think about patient safety and what does it mean there. Personnel safety is being considered there.”M7

“We have to think about that the patient receives the best possible treatment” M2

“That’s the customer orientation and economy. Finances and human resources and others, it (ER) might not be so clearly seen there.” M4

“We aim for preventive work as much as possible in our activities.”M1

Some informants talked about **failure demand**. Failure demand is a disturbance in the system and a problem of organisation-oriented service production. It was described as a complex issue that required systemic thinking. The patient getting treated in the right place as early as possible, was expressed as the best environmental act. **Evidence-based-practise** (EBP) was seen as a way

to connect ER to health care. Informants described that health care can produce information for new EBPs.

"About disruptive use of services. That is, that we treat patients in the right place at the right time. Primary care level patients are stuck in specialized health care, which is the most expensive, for example from the point of view of the environment."M2

"With good cooperation with the scientific world, we will certainly be able to find exactly the right solutions and then maybe on the other hand give up on things that are not so relevant."M8

The informants illustrated the rapid pace of development that had happened in health care. Years ago, antibiotics from IV sets were flushed down the drain after use, and piles of trash came from care products. Different **health care innovations** related to care products and methods, and digitalization had changed facilities to go paperless. Health care's waste sorting had advanced, and several types of waste were collected now. **Measurability** was seen as challenging, but also vital, to advance ER in health care. Informants described measurability bringing an incentive to the advancement of strategy. The research on effectiveness was described as challenging.

"Or some treatment method that has developed, like some wound care products do not need to be changed every few days, and the result of the treatment is significantly better than before. Of course, the methods have developed a lot, and that clearly shows in environmental responsibility."M4

"And new practices, such as digitalization and the utilization of it, that's an issue that should also be thought about from an environmental point of view." M6



“However, technology is now moving forward at such a tremendous speed, so it is not as environmentally friendly again, because many usable devices become old again and then we want more accurate diagnostics, especially.” M2

“Without that, that measurability, it's the same dumb information and we all know that it's not that relevant. That in a way we should think about those metrics, that how do we then go, to get that evidence of which direction we're really moving.” M1

### 5.2.2 Strategy in the organisations

Informants described strategy as a way to ensure equality in health care services. Without organisational strategy, the responsibilities were left on the individuals. Strategy-led **guidelines** directed the actions and helped to recall and consider ER in health care. Without guidelines, informants felt that the actions were dependent on the values and motivations of individual managers and stakeholders. ER needed to be strategically noted in the **action plans**, but informants found it was still lacking. Informants suggested national theme days to be implemented in action plans and the annual planning cycle, to put ER more on display.

“One must of course be committed to ER and to think about it in their management, but that would of course require that it is clear, for example, that there is a strategy or there are guidelines.”M4

“It (ER) must be strategically taken into account in that unit's action plan, and also what it aims for.”M1

**Orientation** was key to get new employees in the same set of values and key focus areas in the workplace. Informants recounted that environmental matters were not part of the orientation in their units. Orientation was described as enabler of the transfer of information. Way to improve the orientation and ER were **allocated roles for the environment**. Some informants described having personnel that had an allocated role on waste management, but the personnel did not

often see it as meaningful and also joked about it. Having a person committed to the role was found to be important.

“In what way would this be a part of the orientation, then it also would be implemented. The old employees, may have already forgotten, so to speak, but that all the new employees would receive a similar package of environmental awareness in the same way as for hand hygiene.” M2

“If and when we want to move forward with the environmental issues and recycling and so on, then a person with an allocated role for that needed. And it would be wonderful if it was someone for whom it is such an important matter.” M5

“Well, it could be that there is a role allocated for waste, or it could be that there is a hygiene responsible whose work is included in some areas (relating to the environment). But no role allocated to the environment. And that's where the fragility of the plans can be seen.” M1

“We have had people that were responsible for the environment in the wards. They've been trained too. But I think it's mostly like that they laugh at the fact that they are in charge of waste, what a 'responsible' task. That they describe it as just telling others to put the banana peels in the right waste compartment.” M6

Informants described **implementation** as an instrument for standardized operations, but it was lacking. It was important that strategy had feasible means and adequate resources for the implementation. Unit-specific allocation was key in successful implementation.

“The practical possibilities to implement that (ER) strategy, relating to the tangible in everyday work life. It is of course then again, the line organisation, thinking about how it is possible to have the resources to implement those things.” M3

“There are all these energy saving tips and all the other things, so that yes, at least someone here has probably thought about this issue, but maybe it hasn't been implemented properly.” M9

### 5.2.3 Health care facilities

**Nature** was hoped to be part of the health care facilities and the nature's health effects were recognized. Informants told examples of hospitals in other European countries, that had implemented nature in their facilities in some way, and Finnish hospitals were described as concrete blocks. Health care facilities were not seen as part of the cities' ecosystems, and they were often located on the outskirts. **Unit size** was associated with more agile transformation. Smaller units were described as more capable of changing their course compared to larger organisations. Informants supported that new health care facilities being built had the square footage thought about in the planning stages. Multi-space environments were the modern-day models and construction was described as more responsible compared to the past.

“In the Dutch hospital the patients could go for a walk on these green roofs and enjoy the nature as there were plantations and small trees there. I think here in X the nature elements are being reduced.” M10

“Right now, I represent a large organisation, where everything happens quite slowly compared to a small unit, as a reference.” M8

“We have a lot of small health stations, which can have really good practices that take the environment into account, practices that are already inherent there, and then they can be implemented to other places as well.” M7

Informants described how health care facilities consume a lot of energy. The factors driving the **energy use** were electricity and water usage, lighting, electronics, different medical technologies, and cooling. The vacancy of some health care properties outside office hours were seen as troublesome, as the empty properties still used up energy. Multi-space environments were seen as

way to save up square footage and energy. All informants talked about **waste sorting**. Managers' own offices were described containing recycling points and some break rooms had multiple bins for sorting. Health care specific waste was seen problematic as not all of it was sorted to the full extent. The prior cleaning personnel's strike had shown the enormous amount of waste being produced and it was described as an eye-opening experience. The choice between singly-use instruments versus reusable, was described as tactic to influence the amounts of waste. Recycling medical plastic wastes was not done in most facilities. Notable motivation for recycling waste was reported in personnel and management, but support services did not collect all types of waste.

"Of course, we (health care) consume a lot of electricity, a lot of water, and some of that also comes from the road use."M5

"Health care as a whole, with the pieces of real estate, it's terribly burdening. And our properties are unused most of the time. So how could this be fixed, who could use those spaces?"M2

"I also have a recycling point here at work, at my desk, where I must sort the waste. And then when I go and eat, there are probably seven different bins where I have to separate everything. So, in that yes, it (ER) can be seen every day in this way."M6

" It all goes into the mixed waste. So, health care really puts a lot of burden on the environment, and perhaps recycling would be something that should be made more efficient."M5

#### **5.2.4 Wellbeing services county**

Health and social reform with WSC of North Savo like all WSCs launched at the beginning of 2023. Informants described scattered processes and missing systems from the time before the reform. **Financial discipline** was prioritized at the WSC, and it was found in writing in strategy. This was seen in procurement and competitive tendering. Equipment maintenance was

described as expensive, driving the choices towards single-used items from medical equipment to coffee cups used in meetings. The informants explained that the number of training days was limited due to the economy. Tight finances were not only seen as a barrier, as it was **co-beneficial fiscal responsibility and ER** when consumption was being considered. Remote appointments had the background on protecting resources and finances, and they reduced travel and its emissions. Financially tight procurement meant fewer excess goods being ordered and less strain for the environment from production and transport.

“Currently the money is the main thing. So whenever you can save on something, the environmental value is not prioritized, but money is. And of course, it's a challenge.” M2

“I don't see the economic factors only as limiting, it can also enable us to start thinking more carefully about, for example, consumption or logistics or acquisitions or other things.”M4

“Of course, there is the economic background, but of course there is also an environmental background, when trying to avoid ordering excessive amount of goods.”  
M5

WSC of North Savo was described as a **sparsely populated area**. It was recognized that some other areas in Finland were more advanced in environmental matters. With tight finances, the service net was under inspection, and patients needed to travel to larger centres for services. Public transport was not an option for all patients. Emissions from **logistics** had multiple sources and it included the transportation of goods and people. The delivering of goods was described as something that should be done in bulk. Remote connections and telehealth were reducing the strain from logistics.

“This is such an urban area where people live, that there’s also large green areas, it’s a sparsely populated area. So there is really no other option than to use your own car.”M2

“When we think of the X area, where there are many of these small municipalities and there is no public transport for long distances. In other words, the customers can't move around like they do with public transport, to get to the bigger centres. So people need to drive their own cars or get a taxi or ride-share with the neighbour or someone else.”M4

“We have so much traffic, for example, so much operational traffic, used in some other location or transferring from one location to another. There is so much of driving a vehicle, taxis go, ambulances go. Then we also move goods.” M5

“With traveling, for example, we try to use these remote connections for training. So that you don't always have to travel to the location or that if you do need to travel to the location, then you don't necessarily fly somewhere like Helsinki.”M10

With the new reform and WSC, **integration of good practices** was still in process. The differences between pre reform primary health care and specialised health care were still noticeable. Differences were also between work units and methods of operations varied. Environmental plans from pre-reform era were missing. **Communication of good practices** was lacking in the WSC. Sharing one's expertise was seen as environmental act as reinvention was avoided. Structures and methods for structured communication were not in place and communication across organisational boundaries was difficult. Informants described environmental issues needing to be on the agenda of meetings. The communications' organisational structure in the WSC was described as foxholes, that required WSC level leadership to solve. The WSC was seen as opportunity for cross-organisational communications.

“But we should in some way integrate our methods of practise, and from there we could seek the best possible effectiveness.” M1

“Not all issues have been considered at the WSC. We had an environmental program of the health care district, but now I can't find it here (at the WSC).”M10

“We still talk about specialised health care and primary health care, even though we are in the same WSC. But we still have a lot to do in terms of this and that. But we have perhaps progressed in the way that we have joint meetings.”M7

“Well, it probably varies a bit, there are many people or units and workgroups where the information is communicated. But then there are also those who just don't say anything, who are in their foxholes just doing something.”M6

Informants described the patients being environmentally conscious and paying attention to health care's activities. **Image** was still protected because it wasn't as obvious to see health care's role in emissions. Image issue was also related to the problems with the car parking spaces, and the hope of seeing more bicycle parking locations. Informants suggested that organisations should **subsidize green commuting**. Supporting public transport with travel tickets and bicycle fringe benefits was described as promoting health and protecting the environment. Official request was thought of been made for the electric bike benefit from the WSC. Green commuting was described as a healthy and environmentally conscious example for the clients and patients.

“From the patients' point of view, from the customers' point of view. Such a thing, that I could think that nowadays everyone pays attention to it and wants to know a little whether it is a responsible agency or not. After all, it's an image thing.”M6

“That factory basically runs some kind of closed cycle, but we (health care) just push all that garbage out and no one pays attention to it. If there's a bit of smoke here, it's immediately obvious that the factory is polluting. But nobody asks us.” M5

“If we had bicycle fringe benefits. That would probably reduce car travel, at least when the roads are not slippery.”M2

Most informants did not have any **education or training** on environmental issues. The possible education was based on their own interest and courses done on their free time. Information and instructions on environmental matters were easier to find in their homelife compared to health care’s context. All informants described the need for education on the environment either at work or in previous education. People with allocated role for the environment had gone through training before the reform.

“I believe that some of our health care managers would really need training and introduction, so this part (ER) would integrate into the activities even more strongly.”M1

“You can easily find information on ER relating to your household. But it really requires a lot of time and familiarity to find the same information in health care’s context.” M5

“Well, before the WSC, at least then there was training for the personnel with the allocated role for the environment.”M6

**Values of the WSC** were described as factors in ER. The people in charge of the strategy and guidelines needed to consider the environment in those plans. The organisational level responsibility was ambiguous, and it left the responsibility to the individuals.

“Of course, the attitude, the thinking at the organisational level, that it (environment) would be considered “M4



“If it (ER) does not come on behalf of the organisation, then the responsibility is very much left on that individual.”M5

“Whose job it is to keep these (environmental) things in the limelight and to take them forward and take care of the implementation of those activities. Honestly speaking I don't know that we have anyone named now, that hasn't been discussed. I don't know who is responsible for that at the WSC.” M3

### 5.2.5 Different stakeholders in health care

**Support services** worked closely with health care staff, and their role was found in ER. Support services included multiagency activities, cleaning, catering and property maintenance. Cooperation with them was coordinated from health care's needs, but the contracts were not always focused on environmental aspects. Compostable waste was not always collected from break rooms, and it was left for the personnel to collect and sort them if it was deemed necessary.

“For example, no compostable waste is collected there, and there's a lot of it. Our support services do not produce the collection of biowaste.” M5

“And then there are a lot of multiagency activities here, so that we have that partnership, cooperation, that there are cleaning and catering service employees and there is property maintenance. Those that produce services for us in our properties.” M3

The financial discipline factored in offered training in the WSC. With limited training offered, the personnel would gravitate to training that they were interested in. It was noted that all health care personnel were educated in their respected institutions from vocational schools to universities of applied sciences and universities. Informants pointed towards **previous education** to offer the training and education needed in environmental matters. The implementation was described needing ministry level direction, as it would require changing the curriculum.

“If 12,500 employees would receive a one hour of training, that’s 6.7 person-years. So, every time you think about training, you have to think about what it means. How is it implemented, and then whether it makes sense to train everyone. Or could this be done in educational institutions, like a study module related to environmental awareness.”M2

“At some point, even those at the manager level, would have gone through a registered nursing education or a practical nursing education. That would take it (ER) forward if it's already taught there.”M5

Most informants were unaware on how exactly the **procurement unit** weighted the different responsibilities rising from the regulation. Current financial situation was factoring on finances weighting more in procurement decisions. Informants described that the WSC had taken the procurement decisions further away from the units. Procurement decisions made during the beginning of the COVID-19 pandemic were still fresh in the memory of many informants. Life cycle approach was described connecting with ER. With equipment being updated regularly **repairs** were not always made. Using old equipment was problematic if it endangered the personnel or patients, which reportedly made the issue complex.

“The one who is making the procurement defines the weighting for those criteria themselves, and the price can be defined as not the most important reason. But then there can be these other factors, either functional related to the device or the purchase..or weighting factors that take environmental issues into account.”M1

“If we want, for example, to reduce consumption, then we need increase the lifecycle of products. We must have the possibility of products being repaired or something.”M2

Health care depended on different **manufacturers**, and the packaging was described as containing a lot of plastic. This packaging waste was then the health care’s waste. Informants

depicted a trend towards more and more single-used items from the manufacturers. The finances were reported on factoring the decisions and single-use items were the cheapest options from the manufacturers. Informants pointed towards market principle as the motivator for the increase in single-use items.

“Everything is packed many times in plastic.”M5

“We have quite a lot of these equipment suppliers that, for example, in spirometry we used to have that mouthpiece that was cleaned in instrument maintenance and then used again. Now we got an instruction that they are disposable.”M10

Informants factored **the values of stakeholders** in ER. Manufacturers were valuing money over the environment and procurements were done with weighting factors not focusing on the environment. The service coverage of the support services was partly perceived as a value issue. The characteristics and values of the people in key positions were described to be a significant part of the realization of the organisation's environmental responsibilities.

“Different weighting factors are selected more subjectively than what would perhaps be good, thinking that what kind of acquisitions our operation is based on.”M1

“Of course, it's kind of a question of values, whether we want to resource the support service for that, or whether it would lead to the fact that if the nurses want to compost, then they need to do it themselves.”M5

“I think, we have someone like that, someone in charge of the environment here. So, it just occurred to me that we have a patient safety manager and many other managers. So the question is, what kind of person happens to be selected for that role and how do they go about advancing the matter, that if they do nothing, then no one even notices this environmental issue.” M6



Figure 2. Meso-level factors in environmentally responsible health care

### 5.3 Macro-level factors in environmental responsibility in health care

Macro-level factors related to the policy, legislation, and ongoing global crises. (Figure 3, page 47).

#### 5.3.1 State level policy and environmental responsibility

The work in the WSC and public health care were described to be guided strongly by political decision making. Health care was a large organisation and informants described the need for **national guidance and direction** from the key ministries. The guidance was described as creating the obligation to advance environmental matters. **State control** was connected to the highest decision-making level understanding specific characteristics of health care. ER was not clear on health care's context, which created an obstacle for the policy makers. State control was needed for statutory obligation.

"It could already be from somewhere in the Ministry of Social Affairs and Health, so that the issue would be raised there. It would wake up the Ministry of the Environment to think about this issue, so that it would be like that the guidance starts from there."M5

"In many matters, the stronger political guidance would in a way bring the requirement to react, and if things are scheduled there, they would have to be done. That's how it feels, at least here in X, that there is a need for some kind of strutting around before things start moving forward." M6

"So this requires probably state-controlled political decision-making. That is, those planners and decision-makers need information in common language, so they can make decisions."M2

### 5.3.2 Legislation as a factor

**Legislative obligations** came from different legislation and the Act on Public Procurement and Concession Contracts was cited by many informants. The act was described to enforce taking the environment into account. The current economic situation influenced the finances to be considered as the primary factor. The finances had a toll in the environmental aspects as more single-use items were procured because of legislative obligations to economize.

“We are regulated by different legislation so that environmental issues are taken into account as public sector operators in health care. We have legislative obligations to take environmental issues into account”M1

“Well, it’s actually largely regulated what can be done. The maintenance of the equipment we have is so expensive, so we have to use disposable products, because their total cost is lower, although their environmental impact is greater”M2

### 5.3.3 Global crises

Many informants expressed that the benefit that **COVID-19** brought, was work-from-home options being more available. The crisis had buried environmental matters as there were issues with different supplies and the available PPE for personnel. The urgency of things unfolding caused health care and the society to not think about the environmental impacts of PPE. Improperly disposed face masks were described as an unfortunate legacy from the COVID-19 era. Ongoing **Russo-Ukrainian War** had affected on the component shortage and somewhat continued the crisis mode from COVID-19. The different global crises were described as burying the climate and environmental matters under other processes.

“Of course, the COVID-19 brought the wonderful thing that we don't have to travel to the training days.” M2

“When we are in a crisis situation and when there are problems with supplies, the COVID showed it quite well that when we are in such a tight situation worldwide, so you won't think about those (environmental) things.” M9

“If we think about something like the COVID-19, hand washing and protective equipment. It was such a terribly good example of the fact that there was not a lot of thought put into it, the facemask will probably be a fossil find thousands of years from now” M2

“We've really lived some unusual years. There's been the COVID-19 and the labor struggle, and the Russo-Ukrainian war and they've touched especially this X area of health care a lot.”M9

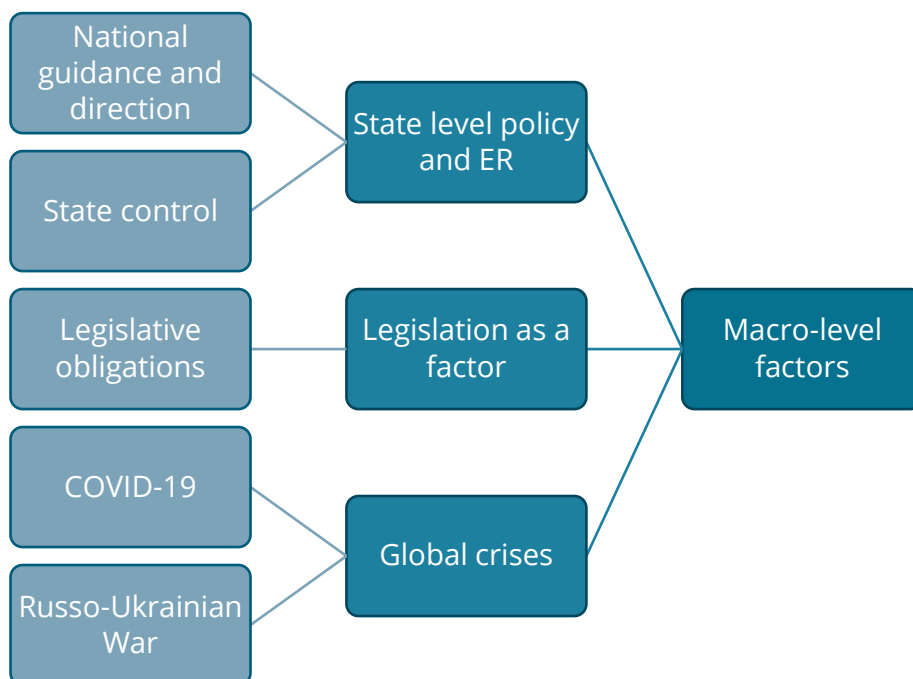


Figure 3. Macro-level factors in environmentally responsible health care

## 5.4 The systemic structure in environmental responsibility in health care

The systemic structure of ER in health care was described by the informants (Figure 4, page 49), who stipulated that the change needs to happen throughout the whole system. The little streams described the diffusing of ER throughout the system.

### 5.4.1 Whole system

Strategy for implementing change on the environmental issues was the systemic approach and having the change in the **whole system**. Guidance from policies and the strategy were described as directing the process. Informants described the factors in ER in health care throughout the different levels. Systemic approach was reported as work in progress and ER on one level was not sufficient to drive the change.

“We need that kind of persistence in it, and the systematic approach as you advance on different steps according to the same strategy.” M1

“This is such a thing that permeates the entire system.”M2

“The line should be clear, and the top management obviously needs to find these (environmental) things important, and that's where it starts to trickle down.” M3

### 5.4.2 Little streams

Small sprouts or **little streams** were ways to implement change in the whole system. All of the employees needed to join in the effort and with little actions the ER would spread. With challenges in resources the little streams were reported as feasible way to implement the change. Turning down the lights when leaving a room or shutting down technology not in use were small actions that everyone could do. Waste sorting in patient rooms was thought of getting the patients thinking about environmental aspects and managers needed to share the issues among their manager colleagues.



“I think that this (ER) will grow as small sprouts like that, and a whole green field will grow from them. ..it needs to become an awareness for all the employees, that in this way each of us can participate in this (environmental) work.” M2

“That it (environment) should be taken into account across the board. .. I think that with small actions, we can achieve big results.” M4

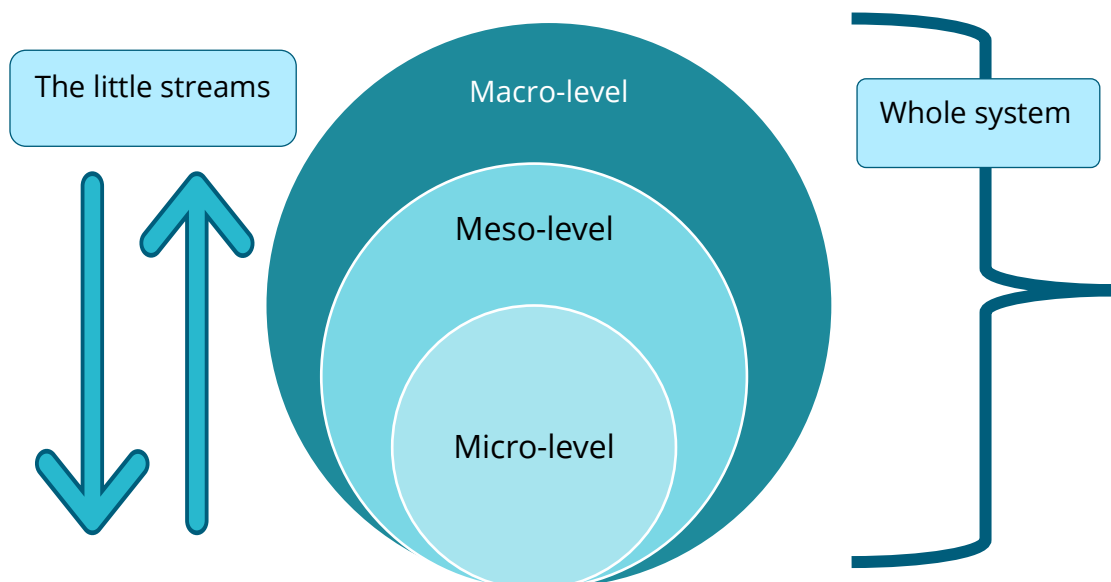


Figure 4. Systemic structure in environmentally responsible health care

## 5.5 Summary of the findings

The informants described the systemic structure in environmental responsible health care. The different levels of the structure needed to interact with each other to implement change through the whole health care system (Figure 5, page 50).



Figure 5. Summary of the findings of the environmental responsibility in health care

On micro-level, the informants had environmental values and practiced environmental actions in their personal lives. An array of environmental actions were described, from collecting trash when walking outside, to delaying new purchases, and buying local produce. From this, it is easy to understand the wide perspective that the informants had on environmental responsibility in health care. As active leaders, the informants could motivate and encourage the staff, and they viewed themselves and their personnel as a resource for the needed change. This required the organisations' support.

On meso-level, the described factors were multifaceted. The strategy of health care organisations was lacking environmental guidelines and action plans. These plans were needed to support the managers and the staff in the environmentally responsible work. Allocated roles for the environment were reported as a way to promote environmental matters. The wellbeing services county was prioritizing financial discipline, and this was seen driving choices to procuring more single-used items. Tight finances were not just a barrier, as it had co-beneficial fiscal responsibility and environmental responsibility when consumption was being considered. With the new health and social reform, integration of practices was still a work in progress and communication

had silos. The hope was that the wellbeing services county, as a large entity, could support environmental responsibility on a larger scale than before the reform. Informants suggested that organisations should subsidize green commuting as this could reduce the emissions from logistics and promote the health of the personnel. To reduce the expenses from education and training, the informants pointed towards previous education to share the responsibility on environmental training. Health care professionals' education in vocational schools, universities of applied sciences or universities could implement the training and education needed in environmental matters relating to health care.

Method of operation in health care meant having a focus on patient and personnel safety and prioritizing the patient care. Preventive work was key in public health work and evidence-based practises could connect environmental responsibility and health care. Different health care innovations had made health care more environmentally responsible; facilities had gone paperless and waste sorting had advanced a lot. However, not all health care waste was collected and sorted to this day, partly because the contracts with support services did not always include all types of waste. Health care manufacturers had their role in the amount of waste being produced with reported excessive plastic packaging and the shift to single-use items. The procurement was done under tight regulation and financial pressure, and informants experienced the procurement decisions being made further away from the units. Health care facilities consumed a lot of energy, and empty properties outside office hours were especially problematic. Informants had seen health care facilities with nature elements abroad and recognized the nurturing aspects of nature. Implementing nature in the facilities and their surroundings was hoped to become part of Finnish health care facilities.

On macro-level, informants described the need for state level policy and national guidance, to obligate health care to advance environmental responsibility. Legislative obligations were already a reality from the Act on Public Procurement and Concession Contracts, but the current economic situation had influenced finances being considered as the primary factor with procurements. Global crises had brought component shortages, but informants reported that the

COVID-19 pandemic did bring work-from-home options more available, which meant less emissions from travelling.

Notable was the role of values on environmental responsibility in health care. Informants described values as factors on themselves, on the personnel, on the wellbeing services county and on different stakeholders. It could be argued that values as a factor is a challenge. Changing values may not be easy as it was pointed out by the informants, that some of their environmental values came from early childhood.

## 6 Discussion

In this research environmental responsibility in health care was represented as a multilevel issue. In environmental policy research ER is described with the term “value-action gap”. It explains the gap between attitudes and behaviours. It is problematic since an individual does not always act rationally or systematically even if information is provided. Environmental responsibility requires more equitable allocation of responsibility between different stakeholders. (Blake, 1999). This was evident in the informants’ observations.

### 6.1 Review on main findings

The purpose of this study was to describe health care’s environmental responsibility from a systemic perspective. The aim was to provide information that can be used to develop environmental responsibility in the health care system. The research material was collected from a nurse manager, chief nursing officers and regional managers (n=10) in interviews in the spring of 2023. In 2017 77,4% of Finnish CNOs and 93% of nurse managers were women (Sosiaali- ja terveystieteiden ministeriö [STM], 2020). This was represented in the research sample, as all informants identified as female.

#### 6.1.1 Role of health care in environmental policy

The work in the WSC was done under political decision making and informants described legislative obligations at times thwarting advances in environmental responsibility. With the economic situation being challenging, the finances weighed the most. Tight fiscal budgeting has also been linked to environmentally responsible health care in a previous studies (Baid et al., 2019; Dunphy, 2014; Tordjman et al., 2022).

The legislation most often indicated by the informants was the Act on Public Procurement and Concession Contracts (1397/2016). The act enables consideration of environmental aspects in all stages of the procurement procedure. This consideration of environmental aspects in procurement is at the discretion of the procurement units. Informants described these procurement

decisions been made away from their units, and the weighting factors being selected subjectively. The goals in legislation are substantial. The Climate Change Act (423/2022) seeks to reduce emissions of greenhouse gases caused by human activity by 2035. Health care is part of that human activity. At the COP26 a group of 50 countries committed to develop climate-resilient and low-carbon health systems. Finland did not commit. (WHO 2021) The lack of commitment was seen in the informants' observations. They described the need for national guidance and direction from the key ministries, the Ministry of Social Affairs and Health and the Ministry of the Environment. Ministry level obligations were needed to advance environmental matters. It has been suggested that the goal for carbon neutral health and social services by 2035 should be included in the national guidance and direction of health and social services in Finland (Pulkki, et al., 2023).

Heating systems and energy use was reported in previous studies. Clinical setting has not been recognized as functional with sustainable development. (Naylor & Appleby, 2013; Nichols & Mukonoweshuro, 2017; Talbot et al., 2022) Health care facilities' energy use was also noted by the informants. The empty properties outside office hours were using energy and it was problematic. Earlier studies have recognized the problematic energy use of empty buildings, especially in colder climates (Kharvari et al., 2022; Yang & Becerik-Gerber, 2014). The directive 2012/27 of the European Parliament and of the Council of 25 October 2012 on energy efficiency, was revised this year. The revision obligates the public sector, that health care represents, to achieve annual energy consumption reductions of 1,9%.

As commuting is part of the transportation emissions in health care, a way to reduce those emissions is motivating staff to commute by bicycle (Kallio et al., 2020; Naylor & Appleby, 2013; Talbot et al., 2022). Informants supported subsidizing green commuting, like the WSC offering bicycle fringe benefits for the personnel. Electric bicycle benefit had been requested from the WSC of North Savo, but the response was still pending. Decision of the Finnish Tax Administration's on fringe benefits 2023, the section 27 describes that if the employee is entitled to ride an employer-provided bicycle (electric bicycle or normal bicycle) for private purposes, this gives rise to

the taxable benefit. This benefit was seen as a way to reduce the emissions from commuting by motorized vehicles and promoting the health of the personnel.

Environmental policy and health care intertwined through legislation and policy, and this was reflected in informants' observations. When health care is under legislative obligations to economize, the environmental aspects are at risk of taking a second place. Policy makers needed information on environmental responsibility in health care's context. The challenge was that environmental responsibility was not a clear concept in the context of health care. This was described by the informants and present in previous studies. (Dunphy, 2013, 2014; Naylor & Appleby, 2013) The need for stronger national guidance and state control was reported. Ministry of social affairs and health needed to take the lead in environmental responsibility in health care. This represents macro-level strategies for implementing change.

### **6.1.2 Barriers for environmentally responsible health care**

Barriers to environmentally responsible health care were visible in all levels.

#### **Micro-level barriers**

Informants described the health care personnel being cautious to change. This caused slowness in adopting new models of operating. In previous studies nurses have described environmental responsibility as a too complicated phenomenon, which was overwhelmingly large and difficult to grasp (Anåker et al., 2015). Resistance to change (RtC) has been explained as ambivalence towards change initiatives as associated pros and cons counterbalance each other in one's mind (Battilana & Casciaro, 2013). RtC and cognitive rigidity towards alternative ideas have been recognised as an occurring phenomenon in health care (Johansson et al., 2014; Tyler et al., 2014).

#### **Meso-level barriers**

The MO of health care was prioritizing safety and the patients. With reported financial discipline at the WSC the resources needed to go the patients care. It meant prioritizing the budget over the environment (Anåker et al., 2015). Procurement under tight budgets was seen as finances

weighting more in procurement decisions. Fiscal budgets have been linked to environmental efforts (Baid et al., 2019; Tordjman et al., 2022).

Organisational strategies were lacking guidelines on environmental matters and it has been noted that promoting environmental responsibility requires guidance (Kallio et al., 2020). Informants described measurability as vital to progress environmental responsibility in health care, but it was found challenging. In previous studies the operating methods have been reported to lack a way to measure sustainable development on a large scale, which has been a barrier to environmental responsibility in health care (Dunphy, 2014; Naylor & Appleby, 2013). The WSC was lacking training on environmental matters and the implementation of environmental strategies was missing. Informants agreed that education and training of personnel was needed (Kelly et al., 2023; Tordjman et al., 2022). An analysis on environmental surveys on state and national level in the US found that making informed pro-environmental choices is difficult without the correct knowledge (Robelia & Murphy, 2012).

With the new health and social services reform, integration of good practices and communication was still a work in progress at the WSC. Communication's organisational structure was described as foxholes. Communication silos existing between primary care and specialised health care have been reported in previous studies (May et al., 2018). As a sparsely populated area with tight financial situation, WSC of North Savo was reported inspecting the service net. Patients needed to travel for services and this meant emissions from logistics (Kallio et al., 2020). As some informants described, disturbances in service production, when the customer receives the wrong service, no service at all or only partially the service they came for, strained the system and with that the environment. This failure demand unnecessarily burdens the organisation's resources (Hyttiälä, 2021).

Contracts with support services caused issues with waste collection, as not all waste was collected. Problems with waste sorting and collection in health care has been widely noted in previous studies. Those problems developed from challenges with sufficient room for the waste sorting (Nichols & Mukonoweshuro, 2017), lack of knowledge on optimal waste management (Talbot



et al., 2022) and the lack of recycling and repurposing programmes (Petit et al., 2023). Notable motivation from the managers and personnel is not sufficient if the support services don't join forces. Manufacturers had their role in the health care waste and informants recommended that manufacturers take responsibility for their products.

### **Macro-level barriers**

Legislative obligations were reported as finances were the most weighting factor with procurements. Global crises like COVID-19 were unexpected and required health care to react quickly. Healthcare operations have been perceived as reactive even before the COVID-19 pandemic. The reactivity of health care has been seen as a focus on crisis management and insufficient consideration of future needs (Anåker et al., 2015; Dunphy, 2013). Informants described COVID-19 and the waste relating to it. The waste was not just facemasks and other PPE, as it was estimated that PCR tests generated 15,000 tons of plastic waste globally until August 2020 (Celis et al., 2021).

### **6.1.3 Strategies to overcome the barriers and implement change**

Strategies to environmentally responsible health care were visible in all levels. Macro-level strategies were discussed earlier in the section on the role of health care in environmental policy.

#### **Micro-level strategies**

Active leadership is encouragement, leading by example and being sensitive to staff suggestions. Previous studies have identified giving feedback and rewarding as important factors in motivating the staff and maintaining their interest in environmentally responsible activities (Kallio et al., 2020). To promote environmental responsibility, the goods used need to be monitored. Avoiding the overuse and underuse of resources promotes sustainability (Baid et al., 2019). Monitoring gives means to plan targets and get successes from reaching them.

#### **Meso-level strategies**

Preventive work was the focus of public health work. Prevention reduces the need for treatment and through that, the use of resources. Informants described the evidence-based practices (EBP) could connect health care and the environmental aspects. EBPs have been reported as reducing

risks without straining the environment (Anåker et al., 2015; Naylor & Appleby, 2013) and education and training are essential predictors of EBP competence (Melnik et al., 2018). The nurturing aspects of nature suggested health care to implement nature elements in its facilities. Walking in nature or exposure to nature can have salutogenic effects on stress-related brain regions and may improve wide range of health outcomes (Soga et al., 2021; Sudimac et al., 2022). This aspect should be thought of when designing new health care facilities. This idea of a green hospital can promote the image of that organisation.

Organisations' guidelines and plans need environmental responsibilities to be strategically noted in them. National theme days were described as a way to visualize the strategies and thus strengthen the implementation of them. Allocated roles for the environment are found in environmentally successful organisations (Naylor & Appleby, 2013), and informants described this as important and also means to improve orientation. The personnel need education and training (Tordjman et al., 2022) and part of that responsibility is pointed towards previous education.

Finances should not prevent actions toward more environmentally responsible health care. Co-beneficial fiscal responsibility and environmental responsibility comes from improving efficiency (Naylor & Appleby, 2013) and implementing remote appointments and tele conferences. Integrating good practices and communicating them helps the personnel out from the communication foxholes and enables learning from other, maybe smaller, units. Facilities need better waste sorting. This was noted by the informants and is has been reported in many previous studies (Naylor & Appleby, 2013; Nichols & Mukonoweshuro, 2017; Tordjman et al., 2022; Yu & Baharmand, 2021). Less waste is generated when the lifecycle of products is increased, repairs are made, and recycling is done appropriately.

The advantages brought by innovations and digitalization such as telehealth and remote conferences, were described as mean to help with the challenges of the sparsely populated region like North Savo. It needs to be noted, that digitalization and telehealth are not the silver bullet if failure demand is not recognised, especially with challenging client or patient cases (Hyttiälä & Mäntyselkä, 2023). Previous studies have found remote services as ways to prevent excessive

travel and thus emissions from it (Kallio et al., 2020; Talbot et al., 2022). Subsidizing green commuting was reported to reduce travel emissions and promote health when commuting by bike. Organisations should offer the staff places to shower and change after their commute.

### **System level strategy**

Factors in environmental responsibility in health care cover the entire system thus the systemic approach is needed. It requires whole health systems involvement. Poor environmental awareness on all levels is a barrier noted by studies (Tordjman et al., 2022) and the informants. The change was reported coming from little streams and it is important to see the value in every little thing being done for the environmental responsibility in health care.

#### **6.1.4 Values in different levels**

The factor in the background at micro- and meso-levels was values, those of the managers themselves and the personnel, and of the WSC's and different stakeholders'. Managers' environmental values produced environmental actions in their personal lives. Childhood experiences may account for environmental awareness (Gifford & Nilsson, 2014) and this was reported by the informants views on their own environmental values. Greater biospheric values (concern for the environment) predicted stronger involvement in climate actions. Widespread climate actions seemed feasible when biospheric values were endorsed strongly throughout the society (Bouman et al., 2021)

This role of values in different levels of the system emphasizes the views shared by the informants, that systemic change is needed. Some informants described how recruiting suitable environmentally aware and knowledgeable person could support environmental responsibility in their units. It has been suggested that during the recruitment processes individual green values and diffusion of the information about organisational green plans would increase the congruence of those values (Dumont et al., 2017). This would require visible environmental plans.

## 6.2 Trustworthiness and methodological implications

### 6.2.1 Trustworthiness in this research

To increase credibility, the results and the research process were described in detail. Transferability was ensured with a careful description of the context, a description of the material and of the phenomenon itself and original quotations. Credibility came from a clear description of the results and recording the process provided validation. The research was done under the supervision of two Master's thesis supervisors. The researcher was reflectively aware of their own starting points and evaluated their impact on the material. (Kylmä & Juvakka, 2007; Polit & Beck, 2010; Tuomi & Sarajarvi, 2018) The researcher had an active part in this study and it is acknowledged that personal environmental values and perceptions on environmental responsibility in health care, and the past allocated role in environmental matters in a University hospital influenced the choice of the research topic (Grove et al., 2013). Informants represented a wide range of experience and with various experiences improved the possibility of illuminating the research questions from diverse aspects (Graneheim & Lundman, 2004).

### 6.2.2 Methodological implications

Most of the informants reported environmental values in their private lives. One informant recounted that her values and interest were the main reasons for the participation in the research interview. As a voluntary interview study, volunteer bias is possible, and the informants might have overrepresented the true proportion of managers that have an interest in environmental matters (Hegedus & Moody, 2010).

## 6.3 Ethical considerations and data protection

This research was done honestly and meticulously in reporting the data, results, methods, and procedures. The research topic was chosen because climate change is a threat to the whole population of the planet. The data was collected in interviews in teleconferences, to enable flexible

use of time for the informants. Informants chose the dates and times for the research interviews. When the interviewees were contacted, they were informed orally and in writing (Appendix 4) that the study is voluntary, about the confidential handling of the material and the possibility to suspend the study. All material was saved on a password protected computer and an external hard drive. Upon completion of the study, the recordings were disposed of as electronic data protection waste. The identities of the interviewees were protected in the processing and reporting of the material. (Finnish National Board on Research Integrity [TENK], 2023)

The results were communicated in an open and responsible fashion and an article will be written about the results. This article will be offered for publication in an international journal. Other researchers work and achievements are acknowledged with appropriate citing. The research permit was applied and received from the WSC of North Savo through the Kuopio university hospital (research number 50UL026). Informed consent was obtained during the interviews prior to going into the interview themes. Preliminary ethical review was not required with this study. This research was conducted without funding. The researcher has no conflict of interest. (Grove et al. 2013; TENK, 2023)

This research was done under the regulation of Data Protection Act (1050/2018) and (EU) 2016/679 of the European parliament and of the council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, EU General Data Protection Regulation (GDPR). Data and Privacy Statement had been composed (Appendix 5).

## 6.4 Conclusions, implications for nursing profession, health care and suggestions for future research

### **Conclusions and implications for nursing profession and health care based on the research results are:**

- The systemic approach is needed: the whole health care system and its partners involvement in environmental responsible practices
- National strategic guidance is needed to advance environmental matters in health care
- Health care organisations should add environmental strategies in their guidelines and action plans
- Health care organisations should offer training in environmental matters and implement allocated roles for the environment
- Chief nursing officers, nurse manager and regional managers were environmentally responsible in their own private lives and need training to implement it to their work
- Health care professionals' education in vocational schools, universities of applied sciences or universities should implement the training and education needed in environmental matters relating to health care
- Health care already has strategies in use, the evidence-based practice and preventive work benefit the clients, patients, and the environment

### **Suggestions for future research based on the research results are:**

- Research on the observations of policy makers on health care's environmental responsibility
- Research to develop education and training programs relating to environmental matters in health care's perspective
- Multidisciplinary research to develop environmental responsibility in health and social care

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**Table 4.** Research literature on environmental responsibility in health care setting

<b>Author(s), year and country</b>	<b>Aim of the study</b>	<b>Material/ Sample</b>	<b>Method</b>	<b>Results</b>	<b>Quality assessment (JBI)</b>
Anåker, Nilsson, Holmner & Elf, 2015. Sweden.	Describe nurses' views on environmental issues and examine their role in environmentally friendly health care.	Nurses, (n=18) Semi-structured in-depth interview (n=8) and two focus groups (n=10)  Snowball sampling.	Interviews, transcription, and content analysis.  The data was collected in April-October 2013.	Two themes emerged in the results:  The inconsistency between nurses' everyday work and environmental issues and the side benefit of mitigating the harms of climate change, which is the progress of health in public health work.	Critical Appraisal Checklist for Qualitative Research.  8/10
Baid, Richardson, Scholes & Hebron, 2019. UK.	To describe the perspectives of health care professionals who treat critically ill patients, on sustainable development and form a theoretical model from it.	Nurses (n=8), physiotherapists (n=2) and technicians (n=1)	In-depth interviews. The technique was Schatzman's dimensional analysis and Straussian grounded theory.	Environmental sustainability was described maintenance of economic, environmental and social resources in the micro (patient, unit), meso (hospital, intensive care network) and macro systems (community, ecosphere) of critical care. The most essential social process that enabled the sustainability of the environment, "satisficing" (stopping the search for the best solution after finding the "necessary good")	Critical Appraisal Checklist for Qualitative Research.  8/10

APPENDIX 1 Literature review table

Author(s), year and country	Aim of the study	Material/ Sample	Method	Results	Quality assessment (JBI)
Chaudhary & Kumar, 2021. India.	To examine the effect of the characteristics of innovation and change adopters on the rate of adoption of environmental sustainability innovations in hospitals.	Hospital administration, managers, doctors, nurses, and staff, (n=70)  Purposive sampling	Non-experimental correlational field design (survey).  Statistical analysis.	The adoption of environmental sustainability innovation correlated significantly with relative advantage, trialability and simplicity. Social influence, like through opinion leaders, is more powerful in more naturalistic settings.	Critical Appraisal Checklist for Analytical Cross-Sectional Studies  7/8
Dunphy, 2013. Australia.	To identify strategies for implementing change in the healthcare industry to support the social and natural environment.	Health care professionals and educators (n=64)	Qualitative semi-structured thematic interview	The recommended strategies were divided into four main categories: changing the workplace culture and professional identity, community commitment, political action and internal change in organisations.	Critical Appraisal Checklist for Qualitative Research.  7/10

APPENDIX 1 Literature review table

Author(s), year and country	Aim of the study	Material/ Sample	Method	Results	Quality Assessment (JBI)
Dunphy, 2014. Australia.	To find out what obstacles health care professionals have to supporting environmental sustainability and how these obstacles can be overcome.	Health care professionals and educators (n=64)	Qualitative semi-structured thematic interview	Health care professionals were more active in environmental responsibility at home compared to their activities at work. The organisation's own support, or lack thereof, mattered. The market focus of health care was found to be an obstacle to environmentally responsible operations. Professionals were also afraid of conflict and professional harassment.	Critical Appraisal Checklist for Qualitative Research.  8/10
Kallio, Pietilä & Kangasniemi, 2020. Finland.	To identify nurses' views on environmentally responsible clinical practices and consensus on stakeholders, roles and tools needed to promote and enable environmental responsibility in clinical practice.	Nurses, first stage (n=35), second stage (n=27)  In the second round, an internet survey for some of the participants of the first stage.	Delphi method, two rounds. In the first round, semi-structured small group interviews and content analysis. and a statistical analysis in the 2 <sup>nd</sup> round.	Environmentally responsible clinical practices focus on efficient use of materials and energy.  To promote and enable environmental responsibility in clinical practice, personnel encouragement and training is needed, as well as certain resources and guidance.	Critical Appraisal Checklist for Qualitative Research.  8/10

APPENDIX 1 Literature review table

<b>Author(s), year and country</b>	<b>Aim of the study</b>	<b>Material/ Sample</b>	<b>Method</b>	<b>Results</b>	<b>Quality assessment (JBI)</b>
Kelly, Raju, Smith & Fioratou, 2023. UK.	To identify and investigate midwives' use of Entonox in the labour ward of a tertiary Scottish hospital.	Midwives (n=10), environmental sustainability manager (n=1)	Semi-structured interviews, thematic analysis using combined deductive and inductive approaches.	A reduction in Entonox use was found to be difficult. Changes were recommended to raise awareness among healthcare staff of Entonox risks and create a more environmentally sustainable work system.	Critical Appraisal Checklist for Qualitative Research.  7/10
Lister, Mostert, Botha, van der Linde, van Wyk, Rocher, Laing, Wu, Müller, des Tombe, Kgan-yago, Zwane, Mphogo & Maric, 2022. South-Africa.	To investigate South African healthcare professionals' knowledge, attitudes, practices, and barriers to environmental sustainability.	Healthcare professionals, questionnaire (n=100), focus group (n=18)	Cross-sectional questionnaire and in-depth semi-structured focus group discussions. Descriptive statistics and thematic analysis.	Study found positive attitudes and a high degree of interest in education, implementation, and taking on more corresponding responsibility, but a lack of knowledge of the subject matter, and only tentative implementation of practices. Identified barriers include a lack of knowledge, resources, and policies.	Critical Appraisal Checklist for Analytical Cross-Sectional Studies  6/8

APPENDIX 1 Literature review table

Author(s), year and country	Aim of the study	Material/ Sample	Method	Results	Quality as- sessment (JBI)
Mundie & Donelle, 2022. Canada	To explore the policies of Canadian nursing regulatory bodies and associations on nursing practice relating to environmental health.	Position statements and competency documents (n=22)	Inductive content analysis	Main themes emerging were: Collaboration (Intersectional and interdisciplinary collaboration), language of engagement (nursing profession as well positioned to work for environmental health), nursing actions (action recommendations) and social justice.	Critical Appraisal Checklist for Qualitative Research.  8/10
Naylor & Appleby, 2013. UK.	To examine the evidence of environmental sustainability in health care and social care, to describe the effects of sustainability on service models and policy, and to find out the connection between the environment and financial sustainability.	Literature review (n=78) and interviews with healthcare professionals (n=28)	Qualitative semi-structured interview and thematic analysis.	Sustainable development is related to improving productivity, engaging personnel, the general public and patients in organisations at all levels, removing systemic and political obstacles and opportunities to improve the sustainability of health and social care by, for example, increasing preventive activities.	Critical Appraisal Checklist for Qualitative Research.  7/10

APPENDIX 1 Literature review table

Author(s), year and country	Aim of the study	Material/ Sample	Method	Results	Quality assessment (JBI)
Nichols & Mukonoweshuro, 2017. UK.	To find out the knowledge of the employees of the neonatal intensive care unit about sustainable development, waste management practices and to identify opportunities related to sustainable waste management in the neonatal intensive care unit.	Care workers in a key position (n=5)	Qualitative semi-structured interview and thematic analysis.	Information and understanding about waste management can influence their waste management behaviour. Changes in practice would be necessary, but the workload and time pressure were perceived as a challenge. Those challenged had special expertise in the costs associated with the wrong separation of waste. Recycling was seen as an opportunity to reduce expenses and generate income.	Critical Appraisal Checklist for Qualitative Research.  8/10
Pavli, Loblay, Rychetnik, & Usherwood, 2023. Australia.	To explore staff perspectives on facilitators and barriers to environmental sustainability in 3 Australian general practices.	Nurses, administrative staff, and doctors (n=23)	Semi structured interviews. Thematic analysis.	Climate mitigation efforts were focused on energy and waste reduction. Three main factors influencing change towards sustainable practice were identified: Leadership, Staff Engagement and Workplace Culture, and Concomitant Benefits.	Critical Appraisal Checklist for Qualitative Research.  8/10



## APPENDIX 1 Literature review table

Author(s), year and country	Aim of the study	Material/ Sample	Method	Results	Quality assessment (JBI)
Polivka, Chaudry & Mac Crawford, 2012. USA.	To determine the knowledge and attitudes of public health nurses about climate change and the role of PHNs in dealing with the health effects of climate change and to find out the differences between population groups.	Public health nurses (n=176)	An online survey based on the EDF-GMU-NACCHO survey and focus group interviews (n=6)	Public health nurses consider the environment threatened and see the role of nursing units in dealing with the health effects of climate change. However, they acknowledge that resources and personnel are limited for this endeavour.	Critical Appraisal Checklist for Analytical Cross-Sectional Studies  5/8
Sijm-Eeken, Marcilly, Jaspers & Peute, 2023. Netherlands.	To determine which organisational and human factors impact the implementation and adoption of sustainable solutions.	Doctors (n=3), environmental coordinators (n=3), medical assistants (n=2), assistant managers (n=2), medical technicians (n=2)	Semi-structured interviews, thematic content analysis.	Study found that the collaboration between active (clinical) agents and facility services employees is essential, and that supply management is an important co-agent. Allocating budget and time were also found to be key factors.	Critical Appraisal Checklist for Qualitative Research.  6/10

APPENDIX 1 Literature review table

Author(s), year and country	Aim of the study	Material/ Sample	Method	Results	Quality assessment (JBI)
Talbot, Barraclough, Sypek, Gois, Arnold, McDonald & Knight, 2022. Australia & New Zealand.	To form a baseline of environmental sustainability practices of dialysis facilities.	Dialysis facilities (n=132). 89% of responders were nurse unit managers or dialysis nurses	An online survey. Data linkage was used to associate dialysis facility-specific metadata.	Environmental sustainability practices, education, and improvements were not prioritized. Most facilities reported only informal efforts to raise awareness of environmental sustainability, and strategies or policies to drive this were lacking.	Critical Appraisal Checklist for Analytical Cross-Sectional Studies  5/8
Terry, Bowman & West, 2019. UK & USA.	To identify what inspired and shaped the environmental activism of nurses in the United States and Great Britain.	Nurses (n=40) purposive sample (USA n=23, UK n=17) Focus groups and individual interviews and observational data.	A phenomenological study based on Gadamerian hermeneutics. The analysis was done through the confirmation of themes and the final "shared horizon".	Nursing's central values of social justice, intergenerational justice, and the alleviation of suffering support the belief in the ability to help alleviate environmental threats. Nurses felt an obligation to act on behalf of individuals, communities, and the planet.	Critical Appraisal Checklist for Qualitative Research.  9/10

APPENDIX 1 Literature review table

Author(s), year and country	Aim of the study	Material/ Sample	Method	Results	Quality assessment (JBI)
Terry & Bowman, 2020. UK.	To find out the feelings of nurses in relation to climate activism.	Nurses active in environmental matters. (n=40) Purposive sample (USA n = 23, UK n = 17)  Focus groups and individual interviews and observational data.	Interviews and observation. Ethnography. Discourse analysis.	The background of climate activism was a strong emotional reaction to the identification of risks. Climate activism is accompanied by an emotional burden, and many felt that the problems were overwhelming. The support of other nursing colleagues is important in supporting coping.	Critical Appraisal Checklist for Qualitative Research.  9/10
Tordjman, Pernod, Bouvet & Lamblin, 2022. France.	To evaluate environmentally sustainable anaesthesiology practices and understand the barriers to their adoption.	Anaesthesiologists and anaesthesia nurses (n=1092)	Online survey, 28 questions.	The main barriers to the adoption of recycling were staff training, budget constraints and a lack of administrative support. Poor environmental awareness on all levels was reported to hinder the implementation of environmentally sustainable practices.	Critical Appraisal Checklist for Analytical Cross-Sectional Studies  5/8

APPENDIX 1 Literature review table

<b>Author(s), year and country</b>	<b>Aim of the study</b>	<b>Material/ Sample</b>	<b>Method</b>	<b>Results</b>	<b>Quality as- sessment (JBI)</b>
Yu & Baharmand, 2021. Canada.	To capture the array of sustainability initiatives undertaken by Canadian ICUs and gain a better understanding of current practices regarding the management of single-use equipment waste.	A nationwide e-mail survey through the Canadian Critical Care Network e-mail list. Hospital sites (n=81)	Survey instrument. Qualtrics Data Analytics software and manifest content analysis.	Barriers included a lack of buy-in from frontline staff and limiting policies from infection prevention and control or waste management departments. Initially primarily driven by budget cuts had saved enough through sustainable changes to save two nursing positions. Changes in supply stocking led to an 80% reduction in the amount of unused equipment waste in an ICU.	Critical Appraisal Checklist for Analytical Cross-Sectional Studies  7/8

Dear participant,

You are participating in an interview that explores health care's environmental responsibility in systemic perspective. The aim of this research is to provide information that can be used to develop the environmental responsibility in the health care system. Interviews are done in Finnish or English. Interviews are done around following interview themes:

- Health care and its role in environmental policy
- Environmental responsibility
- Barriers for more environmental responsible health care
- Strategies to overcome the barriers
- Role of the systemic structure

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Hyvä osallistuja,

Olet osallistumassa haastatteluun, jossa tarkastellaan terveydenhuollon ympäristövastuullisuutta systeemisestä näkökulmasta. Tämän tutkimuksen tavoitteena on tuottaa tietoa, jota voidaan käyttää terveydenhuollon ympäristövastuun kehittämisessä. Haastattelut tehdään suomeksi tai englanniksi. Haastattelut toteutetaan temahaastatteluina. Käsiteltävät teemat ovat:

- Terveydenhuollon rooli ympäristöpolitiikassa
- Ympäristövastuullisuus
- Esteet ympäristövastuullisemmalle terveydenhuollolle
- Strategioita ylittää nämä esteet
- Systeemisen rakenteen rooli

Hi XX!

I am approaching you with a research matter.

I am doing a master's thesis in health sciences at the University of Eastern Finland on the environmental responsibility of health care. The purpose of my research is to describe the environmental responsibility of health care systemically.

My purpose is to interview (as themed interviews) healthcare managers and persons responsible for procurement.

I have a research permit for research in the wellbeing services county of North Savo.

Would you be interested in participating in the study? The theme interview would take place through TEAMS, it will be recorded and transcribed.

People are not named in the study, of course.

Attached is my cover letter.

Regards,

Tiina Ampuja

BHSc, MHSc student, RN, PHN

Dear wellbeing services county of North Savo employee and representative.

The objective of this study is to explore health care's environmental responsibility in systemic perspective. The aim is to provide information that can be used to develop the environmental responsibility in health care system.

The informants in the study will be North Savo wellbeing services county procurement-unit employees and chief nursing officers and regional managers. The research will be carried out in the form of thematic interviews using Microsoft TEAMS remote videoconference software and the interviews are recorded. The interview themes concern environmental responsibility in health care. Interviews are confidential and the duration is approximately 30 to 60 minutes. The identities of the interviewees are protected in the processing and reporting of the material. The recorded interview material will be disposed of after transcription and all material will be stored on a password-protected computer and memory stick. The research material will be destroyed after data retention period has passed.

Participation in this study is voluntary and you have the right to withdraw your participation in the study at any time without penalty. Material collected prior to the withdrawal of consent may be used as part of the research material. I ask for your oral informed consent to participate in the study before the interview. Before starting the interview, I will ask for background information on gender (male / female / other / I do not want to say), duration of employment and educational background. Participants in the study cannot be identified from the completed report.

Why is this research needed? This study aims to provide information on health care's role when deciding on environmental policies and the possible barriers for environmental responsible health care. This study plans to report the possible strategies to overcome those barriers to implement change.

Information about the research: This is the master's thesis of Tiina Ampuja, a MHSc student. An article will be written about the results, which will be offered for publication in an international journal. The master's thesis will be published in UEF eRepo, the open access materials repository of the University of Eastern Finland.

More information:

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Villanova University

M. Louise Fitzpatrick College of Nursing



## Data and Privacy Statement

This is the Data and Privacy Statement of this research under the EU General Data Protection Regulation (GDPR). Composed 28.11.2021. Last edition: 12/13/2021

**1. Registrar:** Tiina Ampuja

**2. Name of the registry:** Master's thesis research personal data registry

**3. Legal basis for data processing:** Data Protection Act (1050/2018) Chapter 1, Section 3: Applicable law: "Finnish law applies to the processing of personal data in the context of activities of an establishment of a controller or a processor located in the territory of the European Union, if the controller is established in Finland." Personal data is processed in accordance with points (a) and (e) of Article 6(1) of the Data Protection Regulation (2016/679), because the data subject has given consent to the processing of his or her personal data for one or more specific purposes and it is necessary for scientific research. The participation is voluntary and withdrawing from the research is optional at any time. The data will not be used for any activities outside the study purposes.

**4. Information content of the register:** The information to be stored in the register: name, position, organization, contact information (telephone number and e-mail address). The data retention period is 5 years.

**5. Sources of information:** The information to be stored in the register is obtained from the interviewees from e-mails, by phone and remote meetings. Information about the contacts of companies and other organizations can also be collected from public sources such as websites and directory services.

**6. Data transfers outside the EU or the EEA:** The information is not disclosed to other parties. Data will not be transferred to the United States.

**7. Registry data security principles:** The register will be handled with due care and the data processed by the information systems will be adequately protected. The controller will ensure that the data stored, as well as the access rights to the servers and other information critical to the security of personal data, are treated confidentially.

**8. Right of inspection and right to request correction of information:** Every person in the register has the right to check the information stored in the register and to request the correction of any incorrect information or the completion of incomplete information. If a person wishes to check or request the rectification of data stored about him/her/them, the request must be sent in writing to the data controller. If necessary, the controller may ask the applicant to prove his or her identity. The controller will respond to the customer within the time limit set by the EU Data Protection Regulation (generally within one month).

**9. Other rights related to the processing of personal data:** The person in the register has the right to request the removal of his or her personal data from the register ("right to be forgotten"). Requests must be sent in writing to the controller. If necessary, the controller may ask the applicant to prove his or her identity. The controller will respond to the customer within the timeframe set out in the EU Data Protection Regulation (generally within one month).