Achieving Sustainability and Environmental Justice in South Korea’s Dental Sector: A Data-Driven Approach Informed by Public Opinion

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INTRODUCTION

Environmental Justice in Dentistry
- Equality in dental resource allocation: This is about ensuring fair access to dental care, which can mitigate oral health disparities
- Equality is critical as disparities in access can lead to worse health outcomes and higher environmental impact
- Equitable distribution of dental resources promotes environmental sustainability by reducing unnecessary travel for patients (thus lowering carbon emissions) and fostering local economies
- By ensuring resources are spread efficiently, we decrease waste and enhance the overall sustainability of the dental sector

Public Understanding and Influence
- Shapes policy development and discourse
- Indicates societal values and priorities in healthcare
- Reveals insight into potential public support for sustainable dental practices

Why is examining public understanding important?
- Understanding public perceptions can inform policymakers on where the public stands on the issue
- When the public is aware and understands the issues at hand, they are more likely to participate in discussions, contribute ideas, and support policy changes
- Public understanding of such issues can highlight areas of misconception or lack of knowledge

MATERIALS & METHODS

For the research, we gather public commentaries (replies) of news articles related to disparities of dental resources.

Data Collection
- Gathering articles and their replies related “Dental Regional Disparities” and “Dental Care Gap” using South Korean news portal (Naver News)
- Total 2,339 articles and 28,984 replies are gathered
- Remove redundancies and irrelevant articles: 2,025 articles and 22,355 replies are used in the analysis (Fig. 1)

METHODOLOGY

Methods
- Applying BERTopic for topic modeling
- For BERT² model, ko-roberta-multitask is used to clarify the themes of Korean replies

RESULTS & DISCUSSION

Result: General Themes of Replies to “Dental Disparities” Articles
- 19 themes are selected to make a cohesive result for all replies (Fig. 2)
- 4 main groups are identified: (a) Number of doctors and facilities, (b) public health policies, (c) political agendas, and (d) COVID-19 related issues (Table 1)

<table>
<thead>
<tr>
<th>Label (english labels set by authors)</th>
<th>Words (Korean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician Shortages</td>
<td>의사 모호, 의사 부족</td>
</tr>
<tr>
<td>Closing Public Health Centers</td>
<td>폐쇄, 공공 보건 병원 폐쇄</td>
</tr>
<tr>
<td>Tobacco Price Increases</td>
<td>담배 용량, 인상, 가격 인상</td>
</tr>
<tr>
<td>Democratic Representative</td>
<td>공당 지도자, 시도 주재</td>
</tr>
<tr>
<td>Increasing Medical School Capacity</td>
<td>학교 석방, 늘이기, 늘리기</td>
</tr>
<tr>
<td>COVID-19 Vaccinations</td>
<td>코로나19, 백신 접종</td>
</tr>
<tr>
<td>Spread of COVID-19 Among Certain Regions</td>
<td>전염, 확산, 특정 지역</td>
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<tr>
<td>Democratic Party Issues</td>
<td>공당 문제, 정치 문제</td>
</tr>
<tr>
<td>Regional Disparities</td>
<td>지역 갭, 지역차</td>
</tr>
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<td>Disparaging Media</td>
<td>공격, 비난</td>
</tr>
<tr>
<td>People Political Favorabilities</td>
<td>평화, 문화</td>
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<td>COVID-19 Mask Policy</td>
<td>코로나19, 마스크</td>
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<td>Democratic Party Politician Favorables</td>
<td>공당 지도자, 정치 지도자</td>
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<td>Ullungdo Island Healthcare Accessibility</td>
<td>엄상도, 부산지형</td>
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<td>Free Welfare</td>
<td>무료, 지원</td>
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<tr>
<td>Ethnically Based History</td>
<td>민족기반, 소속</td>
</tr>
<tr>
<td>General Criticisms of Politicians</td>
<td>일반적인 정치 지적</td>
</tr>
</tbody>
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Table 1. 19 Themes of Replies and Categorization

(Green: # of Doctors, Yellow: Public Policies, Blue: COVID-19, White: Political Issues)

Result: Time-Dependent Themes Change of Replies
- Replies are separated by 3 timeframes (Table 2)
  - 2020-2023: COVID-19 and third Doctors Strike over medical school expansion (2021)
- Themes are categorized by 4 domains (Doctors, Public Health, Politics, Regional(COVID-19)

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992-2013</td>
<td>Doctors</td>
</tr>
<tr>
<td>2014-2019</td>
<td>Public Health</td>
</tr>
<tr>
<td>2020-2023</td>
<td>Politics, Regional(COVID-19)</td>
</tr>
</tbody>
</table>

SUMMARIES
- For replies, 4 main groups are identified
- These domains are related to environmental justice issues
- Equitable distribution of medical/dental professionals reduces travel-related emissions
- Public health policies can encourage sustainable practices
- Political will is crucial for implementing environmental measures
- Regional disparities underline the need for resilient dental care system

DISCUSSIONS & CONCLUSION

Challenges and Considerations
- The connection between the four main domains and environmental justice is not deep, necessitating their expansion toward financial benefits, professional development opportunities, and infrastructures
- Given the significance of news articles in influencing the public sphere, we need to consider the expressed distrust towards journalists, acknowledging potential biases due to our sole reliance on newspaper articles, and aiming to mitigate this distrust

Equitable Distribution of Dental Resources
- The need for policy reform to ensure equitable distribution of dental resources, considering public concerns about number of professionals and facilities
- The redistribution of resources would allow universal access to quality dental care, striking a balance between public and private funding
- Needs of incentives and strategies to address political challenges in increasing the number of dentists in rural settings

Sustainability and Environmental Justice in Dentistry
- Fair allocation of resources and reduces environmental impact of dental practices align with principles of medical justice theory and dental ethics
- Emphasis on the environmental impact of dental practices, suggesting that balanced resource utilization and reduced environmental strain contribute to a sustainable and environmentally just dental care system
- Bridging these key domains and justice theory can provide a comprehensive framework for stakeholders to promote sustainability and environmental justice