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Teleconsultation adoption since COVID-19: Comparison of barriers and facilitators in primary care settings in Hong Kong and the Netherlands

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ABSTRACT

The COVID-19 pandemic has boosted the adoption of digital health technologies such as teleconsultation. This research aimed to assess and compare barriers and facilitators for teleconsultation uptake for primary care practitioners in Hong Kong and the Netherlands and evaluate the role of their different healthcare funding models in this adoption process within the context of the COVID-19 pandemic.

A qualitative research following a social constructivist paradigm was performed. The study employed a conceptual framework from Lau and colleagues that identifies four levels of factors influencing change in primary care: (1) external contextual factors; (2) organization-related factors; (3) professional factors; and (4) characteristics of the intervention. The four levels were studied through semi-structured, open-ended interviews with primary care physicians. External factors were additionally assessed by means of a literature review.

Hong Kong and the Netherlands showed different penetration rates of teleconsultation. Most stakeholders in both settings shared similar barriers and facilitators in the organizational, professional, and intervention levels. However, external contextual factors (i.e., current teleconsultation legislation, available incentives, and level of public awareness) played an important and differing role in teleconsultation uptake and had a direct effect on the organization, the professionals involved, and the type of technology used. Political and organizational actions are required to develop a comprehensive legal framework for the sustainable development of teleconsultation in both settings.

1. Introduction

The COVID-19 pandemic forced healthcare systems to seek innovative service delivery strategies to deal with rising demands while reducing close contact between patients and healthcare workers [1]. Despite its previous marginal presence in the health field, telemedicine, the remote delivery of healthcare services by physicians through means of information and communication technologies (ICT) [2], burst into health systems worldwide [3], especially in primary care, as it remained the first point of contact with the health system [4–6]. The word

"telemedicine" is commonly used as an umbrella term that encompasses a wide array of different interventions [7,8]. An important aspect of telemedicine is teleconsultation. Teleconsultation has been defined as the synchronous or asynchronous consultation by physicians through ICT to omit geographical and functional distance [2,9].

During the pandemic, primary care remotely managed the prevention, triage, diagnostic, and follow-up of COVID-19 patients, while continuing to treat patients with other health needs [10,11]. Nonetheless, equal access to telemedicine services, including teleconsultation, has not been achieved yet [12]. A survey to telemedicine experts from

Abbreviations: GP, general practitioner; ICT, information and communication technologies; Teleconsultation, remote consultation; WHO, World Health Organization.

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40 countries noted the unequal distribution of ICT availability and knowledge among nations and members of society [12]. Thus, with heightened concerns of new pandemic outbreaks [13], there is an urgent need for evaluating the adoption and use of digital technologies during and after health crises in both clinical and social environments [4,14].

Prior to the COVID-19 pandemic, telemedicine usage had been largely limited to the provision of care to populations in remote areas [15–17]. Although during the past decade, a set of disruptive digital health technologies had emerged, offering a more patient-centered approach to patients living with chronic conditions, its uptake in the clinical practice had been low [15,18]. A number of reviews of barriers and facilitators of telemedicine adoption and implementation had been undertaken [7,15–19], but these have largely ignored the healthcare context itself [20], despite the relevance of reimbursement, funding, and fee structures for telemedicine uptake [7,12,15–19]. Furthermore, most of these comprehensive reviews included a broad range of different interventions in a wide variety of healthcare areas, hindering its employment for specific settings.

Digital technologies can improve health outcomes, reduce costs, and enhance access to healthcare during and after the COVID-19 pandemic [14,21,22]. Teleconsultation, as part of telemedicine, has great potential to ease the burden of the pandemic, thereby minimizing its human and economic impact, especially in primary care [10,14,23]. Nevertheless, teleconsultation adoption requires a whole-system strategy in which available technologies, organizational contextual factors, and policies and funding models are taken into consideration [4,20,23], especially in primary care settings since their organizational structures and working practices vary worldwide [20].

The Netherlands and Hong Kong are both high-income settings with similar resources and levels of digital health literacy [4], but the funding of their healthcare systems differs: with a social health insurance approach in the Netherlands (Bismarckian tradition) [24] and a mixed public-private funding model in Hong Kong (Hybrid approach) [25] (Appendix A). This study sought to identify and compare the barriers and facilitators for teleconsultation adoption in primary care in Hong Kong and the Netherlands, and to evaluate the role of their healthcare funding models.

2. Methods

This study followed two strategies to assess the four levels of factors influencing change in primary care described by Lau et al. (2016) (Appendix B): (1) literature review to gain insight into the external level of each setting; (2) semi-structured, open-ended interviews with primary care physicians to gather information on all four levels. The latter qualitative research followed a social constructivist paradigm to gain a deep understanding of the issue by analyzing the different interpretations, perceptions, and experiences of the involved individuals [26,27]. As researchers' experience may shape the interpretation of the results [26], describing the researcher's background is of high relevance. The main researcher (AFC) is a biomedical engineer with expertise in medical devices development. AFC had basic knowledge of qualitative studies, underwent training on the software NVIVO and received feedback from the research team. KHTY has knowledge of quantitative research methods, the Hong Kong health system, and epidemiology and immunization research. IP has obtained a PhD in public health focusing on health economics, priority setting within the Dutch healthcare system. IP published and supervised several literature reviews and qualitative research studies. EASN has experience in quantitative research on the Hong Kong health system, vaccination, child health, and breastfeeding promotion.

2.1. Theoretical framework

The framework developed by Lau et al. (Appendix B) provides insight on the necessary factors to achieve change in primary care and

categorizes them in four levels: (1) external contextual factors; (2) organization-related factors; (3) individual and professional factors; and (4) characteristics of the intervention [20]. The external level encompasses factors beyond the healthcare organization and may involve, among others, the government, the healthcare system, or private parties providing support; it may include policies, incentives, national infrastructure, economic climate, and other factors. The organizational level refers to the healthcare practice and considers diverse factors such as the culture, available equipment, or managerial involvement. Professional factors are determined by the characteristics of the individual physician; for example, personal attitude towards change, experience, and degree of fit with personal style. The intervention level refers to the specific considerations of the new technology, in this case, teleconsultation, such as the implementability, complexity of usage, cost-effectiveness, or security [20].

2.2. Data collection

2.2.1. Literature review

A narrative review was conducted based on the search guidelines of the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) where applicable [28], to address the research question: "What features of the different healthcare funding models facilitate and hinder the adoption of teleconsultation in primary care in Hong Kong and the Netherlands?". A systematic search of PubMed and Embase databases was performed on April 15, 2021, to identify potentially eligible papers. Further information was gathered from reliable gray literature sources to obtain a more thorough perspective. The additional search was conducted on April 16, 2021, on the World Health Organization (WHO), the European Observatory on Health Systems and Policies, and the Organization for Economic Co-operation and Development (OECD) databases, and on the official web pages of the government of Hong Kong and the Netherlands. Two systematic search strategies were followed. First, peer-reviewed databases were searched using a search string determined by four concepts from the central question (Appendix C): (1) The healthcare systems of Hong Kong and the Netherlands. (2) Telemedicine. Although this research focused only on teleconsultation uptake, this field included different common terms to describe e-health categories, as they are often used as umbrella terms. (3) Features of the healthcare system. (4) Primary care setting. All the terms were combined in each class with their synonyms with the logical operator OR and linked the different classes using the logical operator AND. Secondly, reports from the gray literature resources were identified with a broader strategy: using a string only including the keywords (1) and (2). As gray databases' search engines function differently than PubMed and Embase databases [29], the search syntax was adapted to maximize the number of results in each database. Search results were checked, duplicates removed, and titles and abstracts screened to exclude those not meeting the minimum inclusion and exclusion criteria (Appendix D). IP, a native Dutch speaker, screened Dutch gray literature from the Netherlands' government webpage, and AFC screened the remaining publications. When literature suitability to the topic was unclear, AFC and IP discussed until reached consensus. For the gray literature in Hong Kong, only English documents were included as Hong Kong uses both English and Chinese as official languages [30]. Full-text papers meeting pre-established inclusion and exclusion criteria were reviewed. Articles in either English or Dutch were included. An initial translation of peer-reviewed Dutch articles was performed by Google translate, and, if deemed relevant, articles were reviewed by a proficient Dutch speaker (IP). Articles that did not include teleconsultation as an intervention or only included the patient's perspective were excluded. Articles including multiple e-health interventions were screened, and only data regarding teleconsultation uptake was used. Papers detailing research protocols, not available in full text, not focused on Hong Kong or the Netherlands, or published before 2011 were excluded. The decision not to include papers published before 2011 was supported by the rapid and

changing nature of e-health during the past decades [31].

2.2.2. Semi structured-open ended interviews

Thirteen primary care physicians from Hong Kong and the Netherlands were interviewed between May and June 2021. Participants were selected through purposive and convenience sampling with the help of co-investigators who used their professional networks to invite potential interviewees based on different primary care practices within the two settings. All interviews were undertaken by the same researcher (AFC) until no significant new data or themes emerged during the interviews and data saturation was reached. The invitation letter and the informed consent form were sent to participants by email. An interview guide was developed in accordance with the framework of Lau et al. (2016) (Appendix E). Questions were piloted by AFC, EASN, and KSI [Acknowledgments]. The interview guide was updated according to the feedback. The interviewees were unknown to the interviewer (AFC) prior to the study. Interviews lasted approximately 45 min and were performed predominantly in English, according to the interviewee’s preferences. The semi-structured interview allowed some level of variation in the order and framing of the questions but covered all questions in the interview guide. Interviews were conducted by Zoom and recorded, following the informed consent. Recordings were deleted after transferring them to a password-protected external hard drive and obtaining a full verbatim transcript. Participants’ identities were protected by assigning a random number to the transcripts.

2.3. Data management, analysis, and synthesis

A qualitative analysis using NVIVO software and directed content analysis was performed using the framework Lau et al. (2016) (Appendix B) to find the barriers and facilitators of the healthcare system from

the full-text articles and the interviews’ transcripts [32]. The framework determined the initial coding scheme and the relationships between variables. The coding process was performed following the recommendations from Hsieh and Shannon [32]: (1) data (both literature and transcriptions) were fully read, and the relevant information was highlighted; (2) NVIVO software was used to analyze highlighted passages and relevant information identified was classified according to the framework; and (3) data that could not be categorized with the initial coding scheme was identified and analyzed to determine if they could represent a new code category or a subcategory of an existing code. Code results were reviewed by IP and AFC, and disagreements were discussed until reaching consensus. Data were then extracted into a structured Microsoft Excel spreadsheet. Participant quotes are displayed throughout the Results section to provide a narrative presentation of key findings.

3. Results

3.1. Characteristics of included records

The search of the PubMed and Embase databases identified 262 potentially eligible papers (Fig. 1), and after reviewing titles and abstracts, 12 papers were found to fulfill the inclusion criteria (Appendix D). The review of the gray literature databases yielded a total of 876 records, and 45 papers met the inclusion criteria (Fig. 1). Most included papers from gray literature databases that focused on the Hong Kong setting were published by the Hong Kong Legislative Council (n = 7) and were classified as research and policy briefings. Other sources were the Hong Kong Chief Executive (n = 2), the Medical Council of Hong Kong (n = 1), and the Organization for Economic Co-operation and Development (OECD) (n = 1). Likewise, the majority of papers dedicated to

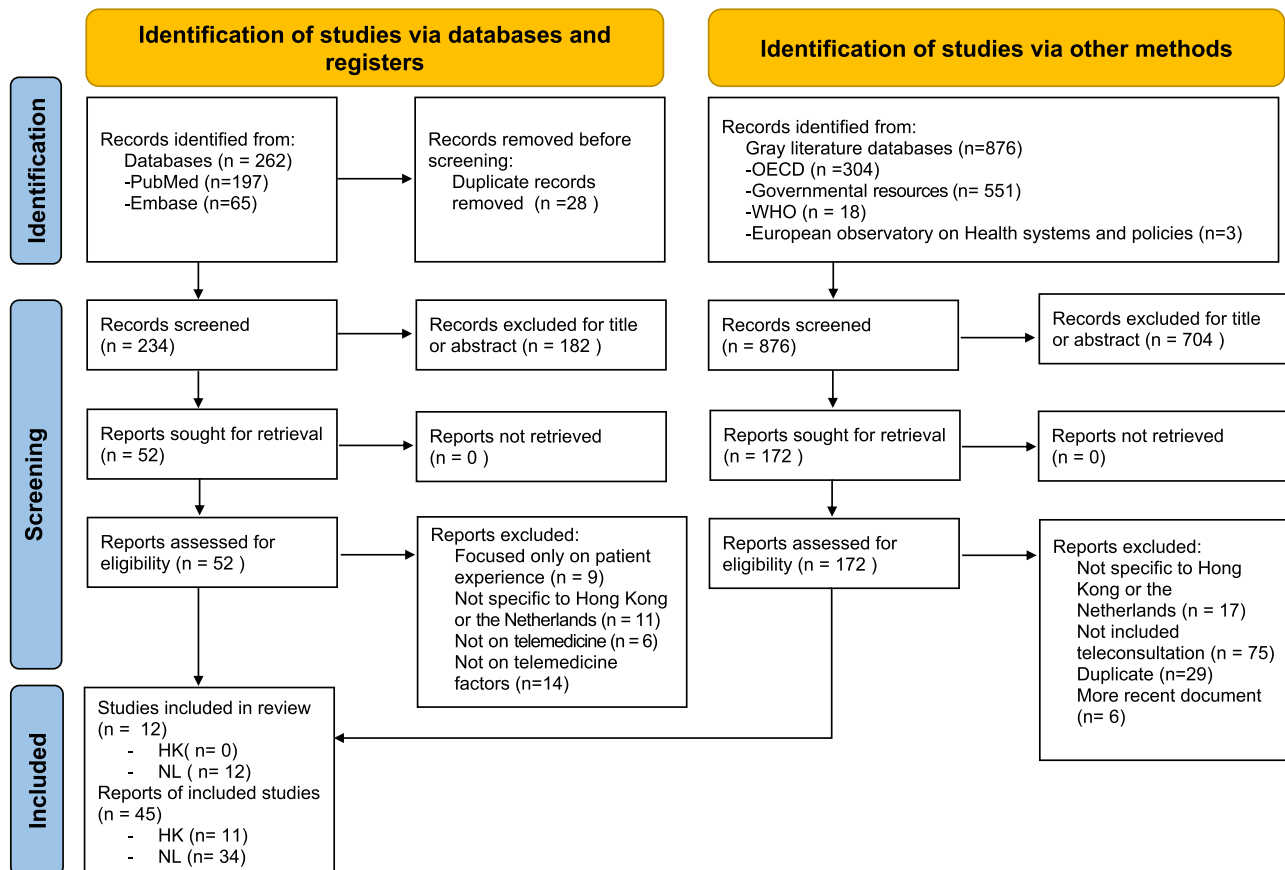


Fig. 1. Study selection flow diagram based on the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.

the Dutch setting in the gray literature search were published by diverse governmental bodies ($n = 24$) and were classified as informational reports. In addition, other common sources were the OECD ($n = 5$) and the European Observatory on Health Systems and Policies ($n = 1$). Appendix F shows the characteristic of all included literature.

3.2. Participants

Participants were numbered from 1 to 13 (Table 1), and these numbers are used with a superscript in the results section to link statements to respondents. All Hong Kong participants indicated that they had not used teleconsultation prior to the COVID-19 pandemic. After the pandemic started, participants 1 and 3 had successfully implemented teleconsultation into their daily practice. Participants 2 and 7 had limited experience with teleconsultation in their settings, and it was only used to manage COVID-19 cases. Participant 6 was in the process of implementing teleconsultation, and participants 4 and 5 had no prior experience with teleconsultation nor had the intention to use it. All Dutch participants had successfully implemented teleconsultation into their practices, and participants 11, 12, and 13 used it as their primary way of delivering care at that moment. All respondents but participant 13 stated not having experiences with teleconsultation prior to the COVID-19 pandemic. Participants 8, 9 and 10, used more email and phone consultation than video consultation. In particular, participant 8 indicated having used video consultation rarely during the last year. Conversely, participants 11, 12, and 13, whose primary way of delivering care was teleconsultation, predominantly used video consultations.

3.3. Thematic analysis

3.3.1. External context

Four factors from the Lau et al. model were highlighted by interviewees: (1) Policy and legislation, (2) Incentives, (3) Public awareness, and (4) Dominant paradigm. However, a new topic emerged during the interviews: (5) Access to care. Other factors from the Lau et al. model were not voiced during the interviews. Conversely, the literature review reported all the factors from the external context of the model, except for the technological advances.

Both settings shared a wide range of barriers and facilitators (Table 2). Common barriers in both Hong Kong and the Netherlands were absence of precise guidelines^{1,2,3,7,8,9,10,11,12} [33–36], lack (or insufficient) financial and non-financial incentives^{1,2,3,4,5,6,7,8,9,10,11,12} [37–44], and patient perception of teleconsultation utility^{4,5,7,8,10,11,12,13} [34,37,45,46] (the latter only being mentioned as a barrier in the Netherlands for elderly patients).

I think people in their 20s,30s,40s are quite comfortable speaking through video call [...] I think a lot of patients seem quite comfortable with it. I think probably older people may find it more strange, [...]they are used to

that doctor they've [known for a long time], and have had a built-up relationship with' (Participant 13, practitioner in a private group practice).

Similarly, common facilitators in both cases were available external training^{1,2,3,7,8,9}, patients' fears of COVID-19 infection^{1,2,3,8,9,10,11,12,13} [37], and teleconsultation and eHealth fitting the national agenda^{10,13} [33,36,37,39–42,44–61,67,70,72,74–78,82,83]. In particular, telehealth implementation could fit different governmental priorities in both settings such as improve healthy aging and ease the burden of caretakers [33,37,41,44,47,51–56,60,67,72,74–78,82,83], reduce the health and economic burden of the aging population and chronic diseases [33,34,37,39,42,44,51,52,55–58,67,76,82,83,75,78], strengthen primary care and enhance care continuity [33,39,48,57,58,70,82,83], support disease prevention and control [47,48], provide the right care in the right place at the right time [60,67,75,76,82], enhance healthcare access for older people living in remote areas [50], empower patients [36,39,41,44,45,53–56,61,67,74,67,76,83], reduce the health and economic burden of the COVID-19 pandemic [47–50], fight labor shortages [44,60,61,67,72,75,76,87], and improve the overall sustainability of the health system [36,39–42,44,46,61–64]. Both settings shared similar levels of stakeholder buy-in [37,43,49,51–55,57,60,65,68,73–76,82,83,84,88], strong internet infrastructure [45,48,53,54,85,86], and economic climate [51,53–55,65,66,73,86], which were mostly considered facilitators for teleconsultation uptake. In addition, due to the COVID-19 pandemic, new funding schemes in were made available in both Hong Kong [50,73,86] and the Netherlands [44,71,74].

Participants reported different factors that hindered teleconsultation uptake in each setting (Table 2). The current telemedicine legislation in the Netherlands was noted as a facilitator, and participants felt protected during teleconsultations^{8,9,10,11,12,13}. In addition, due to the COVID-19 pandemic, the rules for declaring remote consultations were temporarily expanded [44], and deviation from existing quality standards and guidelines was allowed as long as patient safety was not compromised [44]. However, the legislative framework was identified as a barrier in Hong Kong due to its restrictive nature^{1,2,3,4,5,6,7} [33,37], as the available guidelines were broad³ [33,37,38], could have multiple interpretations^{1,3}, and prohibit its use for first time visits^{2,7} [38]. As primary care patients in Hong Kong tend not to have long-established relationships with their GPs, teleconsultation could be rarely used under this rule^{2,7}.

'[Lacking physical examination] would be a great concern that I cannot gain enough information or leading to wrong diagnosis, or delaying the diagnosis, [...], which can be a big medico-legal issue. That's also, I think, a major concern for most of my colleagues' (Participant 4, practitioner in public outpatient clinic).

Dutch respondents shared different experiences with the available subsidies for teleconsultation uptake. One participant reported that the subsidies were helpful⁸, whereas another interviewee found such subsidies to be insufficient for all the costs of teleconsultation adoption¹⁰.

Table 1
Overview of participants.

Participant Number	Location	Setting	Practice	Has successfully implemented teleconsultation?	Preferred type of teleconsultation
Participant 1	HK	Private	Group clinic	Yes	Video consultation
Participant 2	HK	Public, Academia	Hospital	Partly	Phone consultation
Participant 3	HK	Private	NGO	Yes	Phone consultation
Participant 4	HK	Public	Clinic	No	–
Participant 5	HK	Private	Solo clinic	No	–
Participant 6	HK	Public	University clinic	In the process of implementation	–
Participant 7	HK	Public, Academia	Hospital	Partly	Phone consultation
Participant 8	NL	Private	Group practice	Yes	Email and phone
Participant 9	NL	Private	Group practice	Yes	Email and phone
Participant 10	NL	Private	Group practice	Yes	Email and phone
Participant 11	NL	Private	Group practice	Yes	Video and email
Participant 12	NL	Private	Solo practice	Yes	Video and email
Participant 13	NL	Private	Group practice	Yes	Video and email

*HK= Hong Kong, NL= the Netherlands.

Table 2
External context: comparison of Hong Kong and The Netherlands (✓ Mentioned ✗Not mentioned).

Category	Barrier (B) or Facilitator (F)	Factor	Hong Kong	The Netherlands	Refs.	Participants
Policy and legislation	B	Restrictive legislative framework	✓	✗	[33,37]	1,2,3,4,5,6,7
	B	Poor/Improvable guidelines	✓	✓**	[33–36]	1,2,3,7
	B	Lack of awareness on specific guidelines	✗	✓	*	8,9,10,11,12,13
	F	Protective legislative framework	✗	✓	[34,44]	8,9,10,11,12,13
	F	Presence of guidelines	✓	✗	[38]	1,2,3,7
	F	Fit with national agenda	✓	✓	[33,37,39–42,45–59,60–66]	10,13
Incentives	F	Government promotion of telehealth	✗	✓	[44,53,54,57,63–65,67]	None
	F	Presences of supportive policies for ICT use	✗	✓	[44,53,54,68,69]	None
	B	Lack of financial incentives	✓	✓***	[39–41,43,44]	All
	B	Lack of non-financial incentives	✓	✓	[37–41]	All
	F	Subsidies for equipment acquisition	✗	✓	[44,65,70]	8
	F	External legal training available	✓	✓	*	1,2,3,7,8,9
	F	Governmental training on teleconsultation uptake and use	✗	✓	[44,60,65,66,70,71]	8
	F	Funding for research on telehealth	✓	✓	[37,44,51,55,60,61,72,73]	None
	F	Teleconsultation and telehealth can be reimbursed in primary care	✗	✓	[39,40,43,46,60,65,67,69,74]	None
	F	Increased funding and governmental plans for telehealth promotion, uptake, use, and training	✗	✓	[51,53–55,65,66,70,75]	None
Public awareness	B	Patient perception of teleconsultation utility / Limited knowledge/affordability of the elderly	✓	✓****	[34,37,41,45,46]	4,5,7,8,10,11,12,13
	F	Patient fear of COVID-19 infection	✓	✓	[33,34,45,46]	1,2,4,8,10,11,12,13
	F	Patients preferences	✓	✓	*	1,2,4,8,9,10,11,12,13
Dominant paradigm	B	Low prevalence of teleconsultation in the area before COVID-19	✓	✓	[33,37,38,41,43,45,46,49,59,67,70,72,75,76]	4,5,6,8,9,10,11,12
	B	Current low prevalence of teleconsultation in the area	✓	✗	[33,37,38,49]	1,2,3,4,5,6,7
	F	Worldwide trend of teleconsultation uptake	✓	✗	[33,37,38,49]	2,6,7
	F	Neighbor country has extended usage of teleconsultation	✓	✓	[33,37,49,77,78,79]	None
	F	Current high prevalence of teleconsultation in the area	✗	✓	[35,44,70–72,80,81]	8,9,10,11,12,13
Access to care	B	Good access to care	✓	✗	[33]	4,5,6
	F	Limited access to specialists	✓	✗	*	2
Stakeholder buy-in	B	Conflict between GPs and health insurers	✗	✓	[69,81]	None
	F	Good collaboration between GPs and health insurers	✗	✓	[36,43,60,69,70]	None
	F	Government collaboration with research centers, universities, hospitals and public and private organizations	✓	✓	[37,53–55,57,65,73–76,82,83]	None
Infrastructure	F	Participation on international eHealth projects	✗	✓	[51,52,84]	None
	F	Good internet connection and digital infrastructure	✓	✓	[45,48,53,54,85,86]	None
Technology advances	F	Plans on improving internet connection	✓	✓	[54,57,86]	None
Economic climate and governmental financing		<i>Not mentioned neither as barrier or facilitator in either setting</i>				
	B	Economy affected by COVID-19	✓	✓	[50,73,79,86]	None
	F	Increased funding on healthcare and health research	✓	✓	[51,53–55,60,61,65,66,71,73,74,86]	None
	F	Teleconsultation as a tool for improve sustainability	✓	✓	[37,54,64,70,76,82,83]	None

* Not found in the literature.
 ** Lack of specific guidelines available.
 *** Insufficient.
 **** Only elderly, younger perception was a facilitator.

These concerns were also reported in the literature [39–41,43,44], although after the onset of the pandemic, the Dutch government made new subsidies available for digital care uptake [44,70]. The remaining participants did not mention any financial incentives.

‘The system for the payment, the way we got paid from the health insurance, a big part is, [...] health innovation, so when you can show the insurance that you’re doing health innovation they pay you an extra few euros per patient, so if you have a 100 patients, you get 100€ per three months or something [...], is not that much [...], you can’t buy a whole

new computer set’ (Participant 10, practitioner in a private group practice).

Prevalence of teleconsultation, degree of access to care, and specialists were not mentioned as either barriers or facilitators by the Dutch interviewees. According to the literature, the Dutch can easily access care, as the Netherlands has an intricate network of healthcare suppliers and minimal remote areas [57,79], which could explain the limited prevalence of teleconsultation prior to the COVID-19 pandemic [41,43,45,46,59,67,70,72,75,76]. Similarly, some Hong Kong respondents

reported that the small size of the area and good access to care hindered teleconsultation adoption^{4,5,6}, as reported in the literature [33,37,38, 49]. However, one interviewee suggested that teleconsultation could benefit Hong Kong healthcare as it would facilitate connecting with medical specialists groups that may be scarce in the area².

Other relevant differences between the two settings were the available guidelines and reimbursement mechanisms. Despite the Hong Kong practitioners and included literature agreed on the fact that the available guidelines for teleconsultation in primary care were insufficient for its practical use, participants acknowledged them and could rely on those^{1,2,3,7}. However, Dutch participants were unaware of the existence of specific telemedicine national guidelines^{8,9,10,11,12,13}; although, as of April 15th 2021, literature reported that quality standards were being drafted by the Dutch National Health Care Institute [35,36]. The Hong Kong guidelines allowed the utilization of different means of communications that included social media (e.g., WhatsApp, Facebook) [38], which use was forbidden in the Netherlands, according to some participants^{8,10,12}. Both settings had different legislation regarding reimbursement of teleconsultation services. Teleconsultation could be fully reimbursed for general practitioners in the Netherlands [39,40,46,60, 65,67,69]; whereas, the literature did not find any specific reimbursement mechanism for teleconsultation uptake in Hong Kong.

3.3.2. Organizational level

Five elements from the Lau et al. (2016) framework were identified during the interviews (1) Culture, (2) Involvement, (3) Resources, (4) Processes and systems, and (5) Relationship. However, a new topic emerged during the interviews: (6) Patient characteristics.

Hong Kong and the Netherlands reported similar barriers and facilitators at the organizational level (Table 3). Common barriers voiced during the interviews in both settings were the presence of hierarchy^{2,4,7,10}, lack of necessary equipment^{4,5,6,8,9,10,12}, lack of staff technical expertise^{2,4,5,6,8,9,10}, teleconsultation disturbance of workflow^{1,9,10}, and treating older patients^{2,3,4,5,6,7,8,9,10,11,12,13}.

‘So different doctors may have different previous experiences, and they may have various knowledge in technology or in the use of telemedicine. So I’m afraid some colleagues may not be too familiar or feel comfortable when using the computer to see the patients. So it may take quite a long time to adapt to the change in the long run’ (Participant 6, practitioner in university clinic).

Frequent facilitators mentioned were having established means of communication^{All}, participating in shared decision making^{1,3,6,8,11,12,13}, having access to necessary equipment^{1,2,3,7,11,13}, teleconsultation

suitability to practice routine^{1,2,3,7,8,9,10,11,12,13}, and maintenance of good patient-doctor relationship^{2,3,4,5,6,8,10,11,12,13}.

‘I think people, in general, are kind of more relaxed than I would’ve thought [...] because they’re just there at home, in their own environment talking on the screen, it doesn’t seem quite so intimidating perhaps as going into a doctors’ surgery and being in an unfamiliar environment’ (Participant 13, practitioner in a private group practice).

Nonetheless, several factors were not acknowledged by some of the interviewees in each setting (Table 3). First, Hong Kong practitioners that had implemented teleconsultation did not mention struggling with poor technical support in their organization, whereas some Dutch practitioners highlighted it as a barrier^{9,10}. Second, having fellow colleagues with strong technical skills^{11,12,13} and patients having access to the necessary resources^{8,9,10,11,12,13} were only mentioned by respondents from the Netherlands. Third, overall, most Hong Kong respondents shared feeling confident with maintaining a personal relationship remotely^{2,3,4,5,6}, whereas this topic led to mixed opinions in the Dutch participants. Finally, Hong Kong physicians emphasized that young and working-age chronic patients were a facilitator for teleconsultation uptake^{1,3,4,5,6,7}, while Dutch practitioners did not necessarily found having a chronic condition a major facilitator, but instead, all younger patients were the ones easing teleconsultation adoption^{8,10,11,12,13}.

3.3.3. Professional level

Four elements from the Lau et al. (2016) framework were identified during the interviews: (1) Attitude to change, (2) Ability to do practice, (3) Perceived utility, and (4) Competency.

Participants from both settings shared some barriers and facilitators within the professional level (Table 4). Frequent barriers mentioned during the interviews were negative peer experiences^{4,5,9,12,13} and the limited range of diseases that can be managed through teleconsultation^{All}.

‘I’m still a little bit nervous about the diagnosis part without completely seeing the person. If there’s something very stable, ongoing, then [it’s] okay. But then once it’s a little bit outside the usual, the disease pattern, then, it becomes more difficult’ (Participant 3, practitioner in private NGO).

Conversely, respondents of both settings shared common facilitators such as positive attitude to change^{1,2,3,4,6,7,8,9,10,11,12,13}, positive peer experiences^{1,2,3,6,8,10,11,12,13}, positive perceived utility^{All}, and

Table 3
Organizational level: comparison of Hong Kong and The Netherlands (✓ Mentioned ✗Not mentioned).

Category	Barrier (B) or Facilitator (F)	Factor	Hong Kong	The Netherlands	Participants
Culture	B	Strong hierarchy	✓	✓	2,4,7,10
	F	Established means of formal and informal communication	✓	✓	All
Involvement	F	Shared-decision making	✓	✓	1,3,6,8,11,12,13
	Resources				
Resources	B	Lack of necessary equipment	✓	✓	4,5,6,8,9,10,12
	B	Lack of staff technical expertise	✓	✓	2,4,5,6, 8,9,10
	B	Poor technical support	✗	✓	9,10
	F	Access to necessary equipment	✓*	✓	1,2,3,7,11,13
	F	Staff with necessary technical skills	✗	✓	11,12,13
	F	Patients access to resources	✗	✓	8,9,10,11,12,13
	F	Disturbance of workflow	✓	✓	1,9,10
Process and systems	B	Well fit with practice routine	✓	✓	1,2,3,7,8,9,10,11,12,13
	F	Downgrade with patient’s personal relationship	✓**	✓	1,3,8,9,10,11,12,13
Relationship	B	Maintenance of good patient relationship	✓	✓	2,3,4,5,6, 8,10,11,12,13
	F	Older patients	✓	✓	2,3,4,5,6,7 8,9,10,11,12,13
Patient characteristics	B				
	F	Older patients that want to reduce the risk of infection	✓	✗	2
	F	Younger/working-age patients	✗	✓	8,10,11,12,13
	F	Younger/working-age, chronic patients	✓	✗	1,3,4,5,6,7

* Required less new equipment.

Table 4
Professional level: comparison of Hong Kong and The Netherlands (✓ Mentioned ×Not mentioned).

Category	Barrier (B) or Facilitator (F)	Factor	Hong Kong	The Netherlands	Participants
Attitude to change	B	Negative attitude to change	✓	×	5
	F	Positive attitude to change	✓	✓	1,2,3,4,6,7,8,9,10,11,12,13
	B	Negative peer experiences	✓	✓	4,5,9,12,13
	F	Positive peer experiences	✓	✓	1,2,3,6, 8,10,11,12,13
Ability to do practice	B	Limited range of diseases that can be managed through teleconsultation	✓	✓	All
	B	Patient limited trust on remote diagnosis	✓	×	6,7
	B	Unfit with personal style of delivering care	×	✓	8,9,12
Perceived utility	F	Fit with personal style of delivering care	×	✓	10,11,13
	F	Positive perceived utility*	✓	✓	All
Competency	B	Insufficient technical skills	×	✓	9
	F	Sufficient technical skills	×	✓	8,10,11,12,13
	F	Knowledge on teleconsultation	✓	✓	1,2,3,5,7,11,12,13

* Including: chronic diseases management^{1,2,3,4,5,6,7,12}, new born care⁷, pandemics management^{All}, triaging^{3,5,8,9,10,11,12,13}, COVID-19 remote management^{All}, convenience for patient^{1,3,4,6,7,8,9,10,11,12,13} and practice^{2,6,8,9,11,12,13}, lower threshold to contact practioner^{10,11,12}, make care more accessible to people with reduced mobility^{8,12}, treating simpler issues¹, and provide educations on medical treatments⁹.

knowledge on the use of teleconsultation^{1,2,3,5,7,11,12,13}.

‘In cases when they’re appropriate and if the quality is not compromised, then I think it’s good, cause you don’t have to be physically present, it saves time, it’s more convenient, but you are using less protective equipment, you are not exposing people to risk that they should not pass’ (Participant 2, academic and practitioner in public emergency department).

Participants from Hong Kong and the Netherlands reported some differences (Table 4). First, none of the Dutch respondents reported negative attitudes to change, whereas one participant from Hong Kong showed skepticism to teleconsultation and to innovative digital technologies in the practice overall⁵. Secondly, unlike Hong Kong practitioners’ overall positive attitude towards the suitability of teleconsultation, Dutch participants disagreed on whether teleconsultation could positively or negatively fit in their own personal way of delivering care. Thirdly, concerns regarding diminished patients’ trust were not suggested by the respondents from the Netherlands, whereas some Hong Kong participants voiced greater concern on whether patients could distrust the remote consultation validity^{6,7}.

‘Sometimes patients may not be too familiar with this telemedicine, and they may even query if the doctor is making the right decision for them, they would make queries about the clinical judgment of the doctor [...], so, we have to give them confidence and explain further why we make such decisions, and we have to discuss it with them further, we need more discussion and reinsurance to the patients’ (Participant 6, practitioner in university clinic).

Finally, Dutch participants remarked that having sufficient technical skills was a major key for teleconsultation uptake^{8,10,11,12,13}, but it was not significantly mentioned in the interviews with Hong Kong

practitioners, who instead expressed their concerns on the level of familiarity with the teleconsultation intervention itself^{1,2,3,5,7}.

3.3.4. Intervention

Three elements from the Lau et al. (2016) framework were identified during the interviews (1) Implementability, (2) Nature of the intervention, and (3) Safety and data security.

Both settings shared a wide range of barriers and facilitators (Table 5). Common barriers in both Hong Kong and the Netherlands were the need to acquire new equipment^{4,6,8,9,10}, the limited degree of intervention customization^{1,2,3,7,8,9,10,11,12,13}, and insufficient data privacy^{1,2,3,4,5,6,7,9,10}. In particular, some respondents expressed concern about being incapable of assuring patients’ identities remotely^{2,6} or noticing if the patient had sufficient privacy in the room where video consults take place^{3,9,10}.

Common facilitators in both cases were implementing and using available low complexity interventions^{1,3,8,9,10,11,12,13}, intervention’s long-term sustainability^{1,2,3,4,6,7,8,9,10,11,12,13}, increased flexibility in the routine^{1,2,3,7,8,9,10,11,12,13}, and the patients’ lack of data security concerns^{1,3,8,9,10,11,12,13}.

‘[Data privacy] can be a concern, but I don’t think it is a major one; perhaps, what we are concerned more is the patient safety, patient quality of patient care, or medico-legal issues’ (Participant 4, practitioner in public outpatient clinic).

Nevertheless, participants also had different experiences on certain factors that could hinder teleconsultation adoption (Table 5). In particular, Hong Kong participants used overall lower complexity interventions (i.e., telephone and ZOOM video call platform) when compared to the Dutch participants (i.e., email, telephone, and video

Table 5
Intervention level: comparison of Hong Kong and The Netherlands (✓ Mentioned ×Not mentioned).

Category	Barrier (B) or Facilitator (F)	Factor	Hong Kong	The Netherlands	Participants
Implementability	B	Need of new equipment	✓	✓	4,6, 8,9,10*
	F	Low complexity intervention	✓	✓	1,3,8,9,10,11,12,13
	F	Long term sustainability	✓	✓	1,2,3,4,6,7,8,9,10,11,12,13
Nature of the intervention	B	Limited degree of intervention customization	✓	✓	1,2,3,7,8,9,10,11,12,13
	B	High complexity intervention	×	✓	9
	F	Low complexity intervention	✓	✓	1,3,8,10,11,12,13
	F	Increased flexibility in the routine	✓	✓	1,2,3,7,8,9,10,11,12,13
Safety and data security	B	Concerns on data privacy	✓	✓	1,2,3,4,5,6,7,9,10
	F	Patient lack of data concerns	✓	✓	1,3,8,9,10,11,12,13
	F	Added patient privacy	✓	×	1
	F	Trust in higher entities	×	✓	8,9,10,11,12,13

* Participants 11,12,13 already had the necessary equipment available.

teleconsultation within specific software for healthcare). Thus, Dutch participants had to acquire more equipment in comparison. Moreover, unlike the Dutch participants, one participant from Hong Kong suggested that certain patients could benefit from a layer of privacy due to the lack of having to physically travel to the practice¹. Finally, Hong Kong participants did not report trust in higher entities as either a barrier nor facilitator, whereas all Dutch participants^{8,9,10,11,12,13} stated their trust in the company providing the platform for teleconsultation, as well as the higher authorities in control of the regulation (i.e., local authorities, Dutch Government, and European Union).

An extended analysis of each setting can be found in Appendix G.

4. Discussion

This study aimed to identify the barriers and facilitators of teleconsultation uptake for primary care practitioners in Hong Kong and the Netherlands. The results of this research indicated that the national policies and health system are key elements for teleconsultation uptake in both Hong Kong and the Netherlands and have a direct effect on the organization, the professionals involved, and the type of technology implemented.

According to the participants and literature, teleconsultation was becoming more used in the Netherlands after the onset of the COVID-19 pandemic^{8,9,10,11,12,13} [35,44,70–72,80,81]; whereas Hong Kong practitioners reported its scarce uptake in their setting^{1,2,3,4,5,6,7}. Despite the different penetration rates of teleconsultation in Hong Kong and the Netherlands, most stakeholders shared similar barriers and facilitators in the organizational, professional, and intervention levels. Nonetheless, the external context was a key differentiating element between the two settings. In particular, three factors had a major impact on teleconsultation uptake: the current *policy and legislation*, the *available incentives*, and the level of *public awareness*. These results are consistent with similar findings from recent systematic reviews [17,18]. However, other studies diminished the relevance of policies and incentives, and reported major barriers on the organizational level and the necessary economic investment for eHealth uptake instead [15,31]. The current *policy and legislation* were reported to be the main barriers to teleconsultation adoption in Hong Kong, as its restrictive framework greatly limited the use of teleconsultation. Furthermore, the published guidelines were “broad and generic” [38]; thus, affecting the overall teleconsultation spread and, consequently, the level of expertise of practitioners, which had an impact on the organizational and professional level. Likewise, even though the literature review did not report Dutch national guidelines, the legal framework was shown to be more protective towards general practitioners [44]. As stated by the respondents, this protective framework translated into higher levels of trust and comfort for general practitioners^{8,9,10,11,12,13}. Nevertheless, the absence of comprehensive guidelines hindered the usage of teleconsultation in both settings. Standardization is a key factor of eHealth interventions’ success and can ensure interoperability between stakeholders and data security [89]. This standardization can be achieved through changes in the regulatory framework [39,89]. Likewise, as suggested by some Hong Kong participants, having commonly used platforms endorsed by the government could reduce the economic burden of developing a new software from scratch^{2,6}.

Primary care practitioners from both countries noted having insufficient *financial and non-financial incentives*. Nonetheless, the literature review showed existing mechanisms for teleconsultation reimbursement in the Netherlands [39,40,46,60,65,67,69] and reported an increased interest from the Dutch government in 2021 to boost eHealth by means of increased funding and additional training [65,66,71,74]. Although reimbursement had been proved to have a positive influence on the integration and development of teleconsultation in the national health systems [33,40], reimbursement mechanisms for teleconsultation were not found in Hong Kong. The lack of reimbursement mechanisms in Hong Kong could be less relevant than in other settings, as the majority

of primary care is provided by private practitioners with out-of-pocket payments [90–92], and private insurance is less prevalent [92]. However, this lack of reimbursement could impede the use of teleconsultation in some elderly care schemes subsidized by the Hong Kong government that are provided by private clinics [91]. Moreover, the lack of available financing subsidies in Hong Kong hindered the acquisition of new equipment^{4,5,6} and overall teleconsultation implementation. The presence or absence of more incentives (both financial and non-financial) affected factors from other levels, such as the organization’s resource availability and professionals’ expertise [93–96].

Public awareness was considered both a major facilitator and barrier. Dutch practitioners reported a higher interest in teleconsultation usage in the younger population, especially for triaging. Nevertheless, triage services are hard to introduce in the Hong Kong clinical setting due to their guidelines that prohibit teleconsultation for first visits. Hong Kong practitioners are then forced to adopt teleconsultation for chronic conditions instead, which are more common in older adults. Younger people are commonly associated with higher teleconsultation usage in comparison with their older counterparts [97,98]. In addition, a systematic review by Kruse et al. (2018) reported that older age was a major barrier for telemedicine adoption worldwide [17]. Older adults have been shown to be less likely to engage in eHealth interventions due to their limited computer literacy and perceived usefulness [58,99,100]. However, eHealth has the potential of increasing health among this population [101], especially for those with chronic conditions [102–105]; thus, this type of intervention should be kept simple and user-friendly, and older adults should be trained and supported during and after the adoption [99].

Other factors from the external context were reported to have a significant impact, albeit somewhat minor. For example, despite the dominant paradigm was highlighted as a facilitator in the literature [20], it did not relate to the Hong Kong case, which faced growing international pressures, as the telemedicine market had been rapidly developing in Singapore [33,37,49] and mainland China [106,107], yet teleconsultation usage was limited in Hong Kong [33,37,38,49]. Furthermore, Hong Kong and the Netherlands had good access to care, which had been identified as a barrier for teleconsultation adoption during the interviews. Likewise, common shared facilitators were shown to be the strong internet infrastructure, healthy economic climate, and presence of stakeholder buy-in. Nonetheless, the difference between the stakeholder buy-in was noteworthy since the literature evidenced that Hong Kong had fewer national and international collaborative projects on eHealth research and promotion than the Netherlands.

Common organizational barriers reported by the literature, such as the degree of disturbance in the workflow of the new intervention [15] and the limited digital health literacy [31] were mentioned by respondents from both settings. Nevertheless, most participants reported that the teleconsultation intervention was well-fitted in their practice overall^{2,3,7,8,11,12,13}. Similarly, Dutch participants downplayed the role of digital health literacy and highlighted the importance of digital skills instead. Main professional-related factors mentioned during the interviews, such as competencies and attitude to change, are consistent with the findings of other systematic reviews [16,94–96]. Nonetheless, peers’ experiences, one of the most common barriers and facilitators found in this research, were rarely mentioned in the literature [15,20]. Finally, the most significant factors at the intervention level, the degree of complexity, and possible data concerns have also been discussed largely in the published literature [89,94–96].

This research presents a number of strengths. First, it contextualizes and connects barriers and facilitators for teleconsultation uptake in each setting and goes beyond mere technical aspects. Second, data triangulation was used to compare the results from the interviews of the primary care physicians with the published literature, and different types of primary care physicians from each setting were included. Nevertheless, it should be noted that this study did not include the views of any other healthcare professionals nor policy-makers. Third, PubMed and Embase

were searched, covering up to 91% of the published literature [108], and gray literature helped provide useful specific contextual information that could not have been found in peer-reviewed journals. However, the literature review was concise and limited as its aim was to gain insight regarding the external barriers to teleconsultation. Therefore MeSH terms and EmTree were not used in the search strategy. Likewise, to achieve reliable results during the semi-structured interviews, a fixed topic list was employed to ensure that participants were asked the same questions and transcribed interviews could be checked. Furthermore, to minimize researcher bias and ensure the validity of the results, member-checks were performed.

The findings of this study should be considered in the context of several limitations. First, directed content analysis tends to present a strong bias that facilitates finding supportive evidence rather than non-supportive, as well as to ignore non-predetermined aspects of the studied phenomenon due to the overemphasis on the theory [32]. However, non-included topics did arise from the analysis during the study (e.g., access to care and patient characteristics). Second, during the data analysis, the categorization and coding of the factors affecting the uptake on teleconsultation were done by only one researcher; thus, inter-rater reliability cannot be presented. Nonetheless, the study was supervised by a research team of experts in the field of qualitative methods and the healthcare systems of the Netherlands and Hong Kong to ensure the study's reliability and quality [109]. Third, only studies in English or Dutch were included; thus, the relevant information written in another language such as Chinese (one of the official languages of Hong Kong) may have been missed. Finally, a reduced number of practitioners were involved during the interviews, and the barriers and facilitators described in the present study are based on the participants' descriptions of their practice, competence, and experience, which might not be representative of the whole setting. However, data saturation was reached, and no new insight was discovered after the last interview. Bias may have been introduced as professionals that already had an interest or experience in teleconsultation could be more inclined to agree to be interviewed.

Teleconsultation can enhance access to healthcare, improve health quality, and save time for both patients and practitioners [10,17,21–23]. This study observed how external contextual factors such as financing, policies, and public awareness played a major role in teleconsultation uptake in two high-income settings that have significant differences in terms of structure and funding but reported relatively minor differences at the organizational, professional, and intervention levels. This suggests that similar barriers and facilitators may be applicable to other high-income healthcare settings as well. Notwithstanding the increased use of teleconsultation in both Hong Kong and the Netherlands, its expansion and sustainable development depend on governmental actions [20,33]; especially considering the reported national interests for teleconsultation adoption in both settings [33,37,39–42,45–59]. Thus, policy efforts should be made to develop comprehensive regulatory frameworks and clear guidelines to ensure patients' safety and well-being [39,89]. Financial and non-financial incentives should be considered to facilitate teleconsultation uptake [94], and provide further training for both practitioners [93,95] and patients [58,99], especially given that IT investment for teleconsultation can take years to truly bring cost reductions. As the Netherlands is using a pay-for-performance system, the Dutch healthcare incentive programs should evaluate a broad range of specific criteria for the evaluation quality of care on teleconsultation to make sure that both payers and end-users benefit from the program [110]. Moreover, primary care practices should analyze the target patients for teleconsultation and adapt the intervention to their needs and capabilities to maximize its possible benefits [46]. Likewise, teleconsultation systems should be designed to have a limited impact on the practitioner workflow and workload.

Based on the current study, several recommendations could be made for further research. First of all, it is recommended to undertake a

quantitative study of the prevalence of the barriers and facilitators in a major population, as the sample of this study could have already had a positive non-generalized attitude towards teleconsultation. Second, research on best practices and implementation could benefit teleconsultation adoption and usage [41,42,46] and reduce other major barriers such as disturbance in the workflow. Furthermore, such studies should include multiple stakeholders, such as healthcare professionals, managers, and patients, to gain insight on other key barriers and facilitators that this research may have missed [39,56]. Third, applying the comprehensive model from Lau et al. (2016) allowed a systematic data assessment of four different levels influencing teleconsultation uptake (external, organizational, professional, and intervention); nevertheless, new topics emerged during the analysis. Therefore, such new insight could be considered when applying the model of Lau et al. (2016) in subsequent studies. Nonetheless, future research should explore the use of conventional content analysis to gather new insights that may have been missed by using a pre-defined set of categories [32]. Finally, as the health environment is irremediably becoming digital [14], scientific evidence on the effectiveness and cost-effectiveness of eHealth solutions that also contain teleconsultation are needed [39,41,42,55,59] to ensure a safe and sustainable healthcare future.

5. Conclusion

This study provided insight into the barriers and facilitators for teleconsultation uptake for primary care in two high-income settings: Hong Kong and the Netherlands. The findings indicated that the external context played a major role in teleconsultation uptake in both settings and directly affected the organization, the professionals involved, and the type of technology used. In particular, three external factors had a major impact on teleconsultation uptake: the current policy and legislation, the available incentives, and the level of public awareness. Therefore, further research and political actions are essential to facilitate the sustainable development of teleconsultation in primary care in both settings.

Ethics approval and consent to participate

This study received approval from the ethics committee of Maastricht University (FHML/HPIM/2021.037) and the Chinese University of Hong Kong (SBRE-20–648) prior to the data collection. Every participant signed the informed consent before taking part in the interview.

CRedit authorship contribution statement

Andrea Fernández Covés: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. **Karene Hoi Ting Yeung:** Methodology, Validation, Writing – review & editing. **Ingeborg M van der Putten:** Conceptualization, Methodology, Validation, Supervision, Writing – review & editing. **E. Anthony S Nelson:** Conceptualization, Methodology, Validation, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors have no conflicts of interest to declare.

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Supplementary materials

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Interviews' transcriptions, and datasets generated in this study are not publicly available due to individual privacy rights that cannot be compromised.

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