

## Tables and Figures

Figure S1: PRISMA Diagram

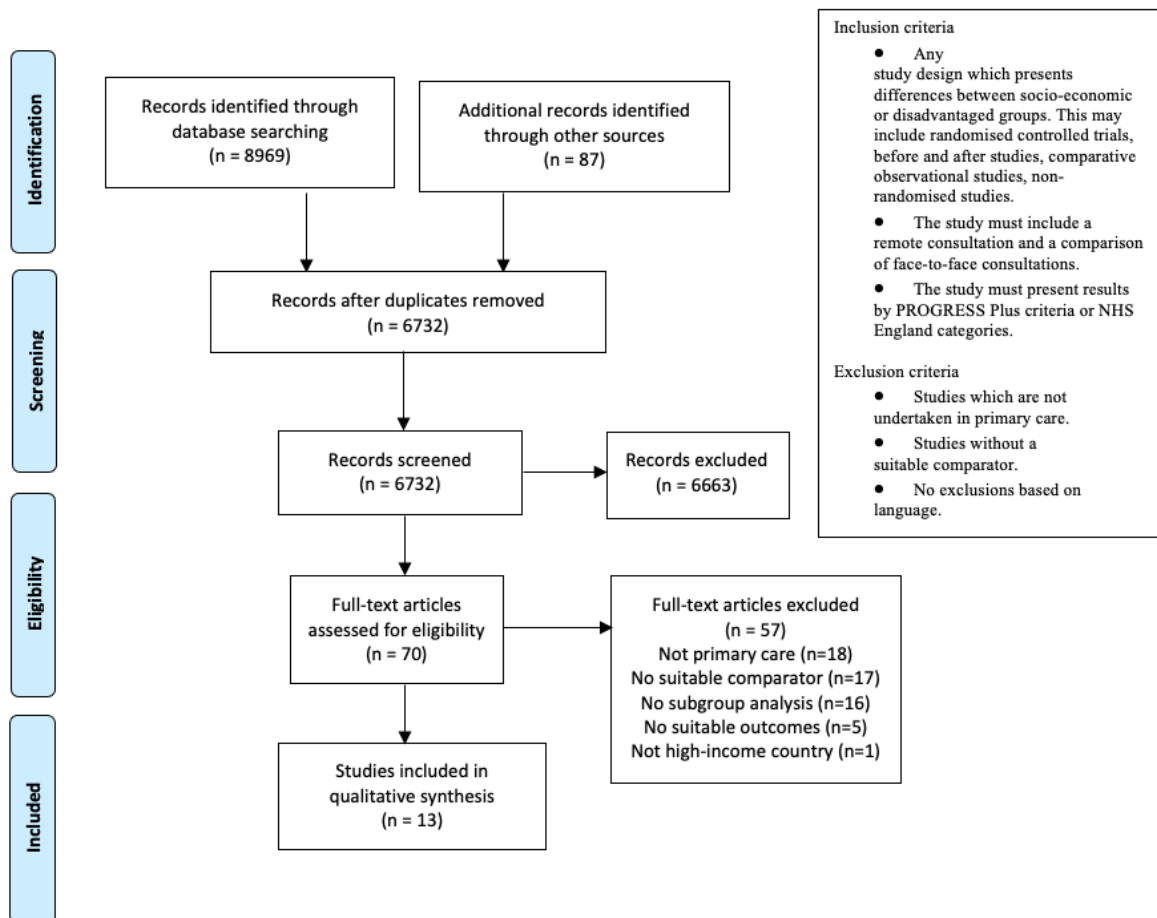


Table S1: Study Characteristics

First author, year and country	Aim	Study design	Data sources	Population	Intervention	Comparator	Length of study	Outcomes by inequality
Atherton 2018 UK	To examine the feasibility of using routinely collected data to assess the number of consultations of different types in UK general practice.	Mixed-methods case study	Electronic medical records and appointment systems	274,517 consultations relating to 77,513 pts	Telephone, email, video and e-consults in general practice	Face-to-face consultations in general practice	6 mths	Utilisation by age, sex, ethnicity and deprivation
Beckjord 2007 USA	To report on the prevalence of and changes in online patient-provider communication in 2003 and 2005 and describe sociodemographic and health-related factors.	Cross-sectional survey	HINTS 2003 and HINTS 2005 (cross-sectional surveys)	Internet users in HINTS 2003 (n = 3982) and HINTS 2005 (n = 3244)	Using the Internet or email to communicate with a doctor or doctor's office	Never having used the Internet or email to communicate with a doctor or doctor's office	12 mths	Utilisation by age, gender, education, income, race, place of residence and health status.
Bertelsen 2015 Denmark	To report findings of citizens' perception and use of technology for healthcare	Cross-sectional survey	Questionnaire distributed by MEGAFON (a Danish market research agency)	1,058 people who were part of a citizen panel. 51% were female and 49% were male. Age ranges from 18 to 70+ yrs	Using ICT to communicate with a general practitioner	Never having used ICT to communicate with a general practitioner	1 week	Utilisation by age, gender and education
De Luca 2012 Italy	To explore differences in healthcare utilisation between Italian immigrants and native Italians	Cross-sectional survey	2004/2005 Italian Health Conditions survey	102,857 pts <65yrs living in Italy, including 3,437 non-Italians. 95% of the sample were natives, 2% were naturalised citizens, 3% were first-generation immigrants, 0.5% were second-generation.	Telephone visits	General practice, specialist and emergency visits.	1 mth	Utilisation by immigrant status
Dyhr 2007 Denmark	To compare and quantify contacts in general practice of immigrants in Copenhagen.	Descriptive register-based study	Health Insurance Register	423, 201 residents of Copenhagen including over 2 million daytime contacts	Telephone contacts	All contacts	1 year	Utilisation by immigrant status
Eibl 2015 Canada	To compare in-person versus telehealth-delivered Opioid agonist therapy.	Retrospective cohort study	Administrative database	5,854 pts who commenced opioid agonist therapy between 2010 and 2012 across 48 clinics in Ontario, Canada.	Treatment via telephone (> 75% appointments by telehealth)	Face-to-face (< 25% appointments by telehealth)	12 mths	Retention of opioid users in treatment
Ekman 2019 Sweden	To present a descriptive review of digital primary care in Sweden.	Observational study	Data from providers and primary care clinics with socioeconomic status from the national bureau of statistics.	Office-based care: 200,000 people in the Kronoberg Region. Digital consultations: 265,000 digital consultations covering 90% of all digital consultations in Sweden during the study period.	Digital care – a primary physician consultation by means of some digital platform (synchronous or asynchronous), such as webpage or mobile application.	Traditional, office-based primary care	19 mths	Utilisation by place of residence, socioeconomic status, age and sex.
Gonzalez 2018 Spain	To describe and analyse a teleconsultation modality based on a simple telephone call, using either landline or mobile phone.	Retrospective longitudinal observational study	Institutional database of the SERGAS	Population of Galicia, Spain, <14yrs, including 2.4million people in 2014 and 2015 (48% male, 52% female)	Telephone consultation in general practice using a conventional voice phone call	Conventional face-to-face consultation in general practice	24 mths	Utilisation by sex, age and urbanisation
Huygens 2017 The Netherlands	To understand the use of email consultation by different patient groups, compared with other GP consultations.	Retrospective observational study	Dutch routine electronic health record data from Primary Care Database for 2010 and 2014	200 general practices in 2010 (734,122 pts, mean age 42yrs, 46% male) and 434 practices in 2014 (1.6million pts, mean age 43yrs, 46% male).	Asynchronous email consultations in general practice between pts and healthcare professionals	Face-to-face consultations	24 mths	Utilisation by age, gender and socioeconomic status Diagnosis category
Mehrotra 2012 USA	To understand who chooses to seek care via an eVisit.	Retrospective longitudinal observational study	Electronic medical records from primary care practices.	5,165 sinusitis visits and 2,954 visits for UTIs at four practices (with no visit for a similar diagnosis in the previous 21 days). Children excluded.	Asynchronous eVisits in primary care using an online questionnaire through a secure patient portal account.	Office visits in primary care	18 mths	Utilisation by sex, age, marital status, employment status, race and household income by zip code
Newbould 2017 UK	To evaluate a telephone first approach	Time series and cross-sectional analysis	Surveys in general practices, National GP Patient Survey and Hospital episode statistics	146 general practices adopting the telephone first approach compared with a 10% random sample of other practices in England (n=842). Survey sent to 1873 pts from 20 practices using telephone first approach. 837 responses.	Telephone first - Pts speak to a GP first, followed by same day face-to-face appointment if necessary.	General practices that do not use a telephone first approach (10% random sample of other practices in England)	24 mths	Effects by employment status
Ronis 2017 USA	To explore utilization among impoverished inner-city children compared with more affluent suburban children.	Observational study	Insurance files	1217 eligible children (84,287 child-mths) from children <6 in inner city Rochester, rest-of-city Rochester, or the surrounding suburbs	Health-e-Access Telemedicine Model - telemedicine visits between pts and physicians as well as the capture of relevant images, videos and sounds from pts.	No access to telemedicine in suburban and inner-city children	187 child-mths (14.3 yrs)	Utilisation and acute care use in inner-city children
Uscher-Pines 2014 USA	To compare the sociodemographic characteristics of enrollees who used Teladoc with those who used EDs and physicians' offices.	Observational study	Deidentified health plan claims data and enrolment information from CaPERS	2,718 Teladoc users and 72,191 nonusers enrolled in their health plan from Apr 2012 to Feb 2013 and who were not enrolled in Medicare Advantage or Medicare supplemental plans.	Pts request a consult via telephone or the Internet which takes place within 25 minutes by telephone (99%) or videocall.	Face-to-face consultations with physicians and ED visits	12 mths	Utilisation by age, sex and socioeconomic status.

Table S2: Outcomes reported by inequality group

First author and year	Place of residence	Race/ethnicity/culture/language	Occupation	Gender/sex	Religion	Education	Socioeconomic status	Social capital	Plus - age	Plus - other
Atherton 2018		√		√			√		√	Disability
Beckjord 2007	√	√		√		√			√	
Bertelsen 2015				√		√			√	
De Luca 2013										Immigrants
Dyhr 2007										Immigrants
Eibl 2015										Opioid users
Ekman 2019	√						√		√	
Gonzalez 2018	√			√					√	
Huygens 2017				√			√		√	
Mehrotra 2012		√	√	√			√		√	
Newbould 2017			√							
Ronis 2017	√						√			
Uscher-Pines 2014				√			√		√	Disability

Table S3: Risk of Bias

First author	Bias due to confounding		Bias due to selection of participants into study		Bias in classification of interventions		Bias due to deviations from intended interventions		Bias due to missing data		Bias in measurement of outcomes		Bias in selection of reported result	
	Risk level	Reason	Risk level	Reason	Risk level	Reason	Risk level	Reason	Risk level	Reason	Risk level	Reason	Risk level	Reason
Atherton 2018	High	Data not age standardised and may confound ethnicity data	Low	Suitable selection of studies to reduce bias	Moderate	Not every practice offered all types of consultation.	Low	No systematic differences in treatment of intervention groups.	Moderate	Missing some email correspondence data	Moderate	Face to face consultations may have been recorded as the default	No information	Protocol or statistical plan not published a priori
Beckjord 2007	Moderate	Important confounders were measured and adjusted for in the analysis	High	African Americans and Hispanics were oversampled in 2003. Only internet users included.	Low	Intervention well defined	Low	No systematic differences in treatment of intervention groups.	Moderate	Responses of "refused" or "don't know" were counted as missing.	Moderate	Self-reported outcomes	No information	Protocol or statistical plan not published a priori
Bertelsen 2015	High	GP surgeries that use computers in consulting rooms more likely to provide internet-based consultations.	High	Self-selection onto a citizen's panel via application, then chosen to represent society. Response rate was 40.7%	Low	Interventions well defined	Low	There were no systematic differences in treatment of intervention groups	No information	No information	High	Outcome measures were objective, but respondents reporting on behalf of their relative.	No information	Protocol or statistical plan not published a priori
De Luca 2013	High	Results reported in this review not adjusted for potential confounders	Moderate	Nationally representative sample. 65+ not sampled, but sampled population was weighted. No information on response rate.	Low	Interventions well defined	Low	There were no systematic differences in treatment of intervention groups	No information	No information on missing data	Moderate	Outcomes self-reported	No information	Protocol or statistical plan not published a priori
Dyhr 2007	High	Results not adjusted for potential confounders	Low	All possible participants included	Low	All possible participants included	Low	No systematic differences in treatment of intervention groups.	No information	No information on missing data	Low	Data collected from medical records	No information	Protocol or statistical plan not published a priori
Eibl 2015	High	Analysis not adjusted for potential confounders	Low	All possible participants included	Low	All possible participants included	Low	No evidence of any systematic differences in treatment of intervention groups	No information	No missing data described	Low	Objective outcomes	No information	Abstract only
Ekman 2019	High	Analysis not adjusted for potential confounders	Low	All possible participants included.	Low	Interventions well defined	Low	No evidence of any systematic differences in treatment of intervention groups	Low	Limited missing data	Low	Data collected from medical records	No information	Protocol or statistical plan not published a priori
Gonzalez 2018	High	Analysis not adjusted for potential confounders	Moderate	Patients selected which remote or face to face consultations	Low	Interventions well defined	Low	No evidence of systematic differences in treatment of intervention groups	Low	Limited missing data	Low	Objective outcomes	No information	Protocol or statistical plan not published a priori
Huygens 2018	High	Analysis not adjusted for potential confounders	High	General practices that did not fulfil the criteria for completeness of registration were excluded.	Low	Interventions well defined	Low	No evidence of systematic differences in treatment of intervention groups	Low	Limited missing data	Low	Objective outcomes	No information	Protocol or statistical plan not published a priori
Mehrotra 2012	Moderate	Bivariate and multivariate analysis performed.	Moderate	Pts without a patient portal account excluded.	Low	Interventions well defined	Low	No evidence of systematic differences in treatment of intervention groups	No information	No record of missing data	Moderate	Estimation of income taken from a median based on zip code, not from individuals, but this was done in the same way for all.	No information	Protocol or statistical plan not published a priori
Newbould 2017	Moderate	Only results by employment included	Moderate	Self-selection of pts in choosing to respond to survey.	Low	Interventions well defined	Low	No evidence of systematic differences in treatment of intervention groups	Low	Limited missing data	Low	Objective outcomes	No information	Protocol or statistical plan not published a priori
Ronis 2017	Moderate	Before and after comparison with multivariate analysis	Low	Claims data of all available participants	Low	Interventions well defined	Moderate	Some cross-contamination across intervention groups	No information	No record of missing data	Moderate	Possible underestimation of utilization since intervention ended before follow-up period.	No information	Protocol or statistical plan not published a priori
Uscher-Pines 2014	Moderate	Analysis adjusted for age and comorbidities	Low	Claims data of all available participants	Low	Interventions well defined	Low	No evidence of systematic differences in treatment of the groups	No information	No record of missing data	Low	Objective outcomes	No information	Protocol or statistical plan not published a priori

Table S4: Study results

First author and year	Comparison	Health care activity outcomes by inequality group
<b>Telephone consultations versus face-to-face</b>		
De Luca 2013	Telephone consultations versus GP visits	<i>Plus (immigrants)</i> - Natives had a higher proportion of telephone consultations (compared to GP visits) as compared to immigrants (55% vs 49%)
Dyhr 2007	Telephone consultations versus GP visits	<i>Plus (immigrants)</i> – Telephone consultations accounted for 39% of all contacts for non-immigrants and 14-22% for immigrants during the daytime and 50% of all contacts by non-immigrants and 23-36% for immigrants during out-of-hours.
Eibl 2015	Predominantly telephone consultation versus face-to-face	<i>Plus (opioid users)</i> - Pts being treated via telehealth demonstrated a retention rate of 59% (n = 3689), whereas in-person pts were retained at a rate of 48% (p < 0.001 at 365 days).
Gonzalez 2018	Telephone versus face-to-face consultations	<i>Place</i> – Telephone consultations were more likely to be requested in urban areas compared to rural areas. <i>Gender</i> – Women had a statistically significantly higher proportion of telephone consultations compared to men (2% difference in 2014 and 2.3% in 2015) <i>Plus (age)</i> – Telephone consultations were more likely in those over 85 yrs and least likely in those aged 15-25 yrs.
Newbould 2017	Telephone first in general practice vs usual care	<i>Occupation</i> - No evidence that the effect of the intervention was differential between those pts in or not in work (P>0.1 for all, results not shown)
Ronis 2017	With or without telemedicine in suburban and inner-city children	<i>Place and SES</i> - When both suburban and inner-city children lacked telemedicine access, overall acute illness visits were 75% greater among suburban than inner-city children. After introduction of telemedicine to inner-city children, overall acute visits were similar across groups.
<b>Internet-based consultations versus face to face</b>		
Beckjord 2007	Communicating online to healthcare provider compared with not	<i>Place</i> - Those who lived in a non-metro area were less likely to have used online patient-provider communication compared to internet users who resided in metro area counties. <i>Race</i> – Hispanic people were less likely to communicate online (but this was not statistically significant) compared to white people, results for African Americans were mixed and Asian Americans similar to white groups. <i>Gender</i> – For Internet users in 2005, women were more likely to have communicated online with a health care provider compared to men (OR = 1.47; 95% CI = 1.00-2.15) <i>Education</i> – in 2003 those with more education were more likely to use online services, but this was no longer the case in the 2005 data. <i>Plus (age)</i> – In 2003, there was no clear age-related pattern, but in 2005 as age increased there was a decreasing likelihood of using online services.
Bertelsen 2015	Use of technology to communicate with a general practitioner versus not	<i>Gender</i> - 71% female respondents used technology compared with 59% male. <i>Education</i> - 72% with a medium or higher educational background or their relatives, had used technology compared with 46% no professional education or their relatives. <i>Plus (age)</i> - Of respondents between 18 and 29 yrs old, 68% of them or their relatives had used technology to communicate with their GP compared with 62% in the 70+ group
Ekman 2019	Digital versus traditional, office-based consultations	<i>Place</i> – Primary care digital visits were twice as high in Stockholm (42/1000 pop) than the second largest region (23/1000). <i>SES</i> - There was a negative relationship between use of digital care and socioeconomic status at the municipality level. <i>Plus (age)</i> – Digital consultations compared with office-based visits were higher in younger patients (esp 20-30y.os) than older patients.
Mehrotra 2012	EVisits versus face-to-face consultations for UTIs or sinusitis	<i>Race</i> – White people had a higher proportion of eVisits compared to office visits as opposed to black/African America (7.5% eVisits in white people compared with 3.1%). <i>Occupation</i> – people who were working were more likely to use eVisit (8.9% of all visits) compared to those who were unemployed (5.9%) <i>Gender</i> – Women had higher eVisits as a proportion of all consultations compared to men (7.8% compared to 5.0%). <i>SES</i> – No income gradient in the use of eVisits as a proportion of all consultations. <i>Plus (age)</i> – eVisits were more likely in those under 65 (8.0% of all visits) compared to those who were over 65 (2.6%)

**Telephone and internet-based consultation versus face-to-face**

Atherton 2018	Telephone and electronic consultations versus face-to-face	<p>Race – non-white people had a higher unadjusted telephone consultations as a proportion of all consultations compared to white people (21.2% compared with 18.1%).</p> <p>Gender – There was a higher proportion of remote consultations (compared to face to face) in women rather than men.</p> <p>SES – Surgery consultation rates were slightly higher in the least deprived areas, and telephone consultations were slightly higher in the most deprived area.</p> <p>Plus (disability) – The proportion of remote telephone consultations (compared to face to face or home visits) was the same with two or more conditions compared to those with no conditions.</p> <p>Plus (age) – Proportion of face to face consultations was highest in under 4y.o.s and 65-84 year group, whereas remote consultations (telephone, econsult or email) were highest in 24-44y.o.s and 85 year olds. Econsults and emails were commonest in 15-44 age group.</p>
Huygens 2017	Email consultations versus face-to-face and telephone consultations	<p>Gender – Men were more likely to use face to face consultations (45%), compared to email (42%) and telephone (40%)</p> <p>SES – Patients living in affluent areas were more likely to use email, compared to telephone or face to face consultations.</p> <p>Plus (age) – Face to face consultations were used by younger patients (mean age 42.7 years), compared to telephone (46 years) and email (46 years)</p>
Uscher-Pines 2014	Telephone or video consultations via Teladoc versus face-to-face consultations	<p>Gender – Women were more likely to have a Teladoc consultation rather than an office consultation compared to men (Teladoc 5.9% of all consultations versus 4.9%)</p> <p>SES – There was no pattern of Teladoc use as a proportion of all consultations by income.</p> <p>Plus (age) – Younger patients were more likely to use Teladoc compared to other consultations types (6.1% of consultations were Teladoc for 18-30 year olds, 6.8% for 31-50 year olds and 3.8% for over 51 year olds)</p> <p>Plus (disability) – Patients with fewer health problems were more likely to use Teladoc compared to other services (6.1% for those with 0 conditions, compared to 3.9% for those with 1 and 2.0 for those with more than 2 conditions)</p>

Supplementary material: Search strategy for MEDLINE

Health inequality search terms

- 1 Residence Characteristics/
- 2 Environment design/
- 3 exp Marital status/
- 4 neighbo?rhood\*.mp.
- 5 residential environment\*.mp.
- 6 rural\*.mp.
- 7 inner?city.mp.
- 8 housing instability.mp.
- 9 housing insecurity.mp.
- 10 housing strain.mp.
- 11 housing security.mp.
- 12 mortgage problems.mp.
- 13 foreclosure.mp.
- 14 eviction\*.mp.
- 15 housing loss.mp.
- 16 home repossession\*.mp.
- 17 home ownership.mp.
- 18 (repossess\* adj3 hous\*).mp.
- 19 (repossess\* adj3 propert\*).mp.
- 20 mortgage delinquency.mp.
- 21 mortgage arrears.mp.
- 22 mortgage debt\*.mp.
- 23 overcrowding.mp.
- 24 (living adj1 (outside or inside or near\* or adjacent)).mp.
- 25 (household adj2 size).mp.
- 26 (marital status or marriage status).mp.
- 27 (widow\* or cohabit\* or divorce\* or single parent\* or live\* alone).mp.
- 28 or/1-27
- 29 Cultural Deprivation/
- 30 Acculturation/
- 31 Culture/
- 32 Cross-Cultural Comparison/
- 33 Cultural Characteristics/
- 34 Cultural Diversity/
- 35 Language/
- 36 "Transients and Migrants"/
- 37 exp "Emigrants and Immigrants"/
- 38 Minority groups/
- 39 Minority health/
- 40 Prejudice/
- 41 Racism/

42 Xenophobia/  
43 Social Discrimination/  
44 exp Race Relations/  
45 exp Ethnic Groups/  
46 exp Continental Population Groups/  
47 Refugees/  
48 minorit\*.mp.  
49 migration background.mp.  
50 racial.mp.  
51 racism.mp.  
52 ethnology.mp.  
53 race.mp.  
54 ethnic\*.mp.  
55 non?English.mp.  
56 language other than.mp.  
57 latino\*.mp.  
58 latina\*.mp.  
59 hispanic\*.mp.  
60 whites.mp.  
61 caucasian\*.mp.  
62 non?white.mp.  
63 Torres Strait Islander.mp.  
64 aboriginal.mp.  
65 native american.mp.  
66 inuit.mp.  
67 eskimo.mp.  
68 first nation\*.mp.  
69 indigenous.mp.  
70 english as a second language.mp.  
71 foreign language.mp.  
72 or/29-71  
73 Occupations/  
74 Unemployment/  
75 occupations.mp.  
76 unemployment.mp.  
77 or/73-76  
78 exp Gender Identity/  
79 Women's Health/  
80 gender differences.mp.  
81 (sex disparit\* or sex difference?).mp.  
82 gender identity.mp.  
83 sex role.mp.  
84 wom#n\* role?.mp.



85 m#n\* role?.mp.  
86 gender\* role?.mp.  
87 servicewomen.mp.  
88 Sex factors/  
89 or/78-88  
90 exp Educational status/  
91 Education/  
92 Schooling.mp.  
93 educational status.mp.  
94 (education\* adj2 level?).mp.  
95 ((higher or better or worse or less) adj educated).mp.  
96 ((higher or better or worse or less) adj level? of education).mp.  
97 or/90-96  
98 Religion/  
99 religi\*.mp.  
100 or/98-99  
101 Social determinants of Health/  
102 Psychosocial Deprivation/  
103 Sociological Factors/  
104 Working Poor/  
105 Hierarchy, Social/  
106 disparit\*.mp.  
107 inequalit\*.mp.  
108 inequit\*.mp.  
109 equity.mp.  
110 deprivation.mp.  
111 gini.mp.  
112 concentration index.mp.  
113 Socioeconomic Factors/  
114 Social Welfare/  
115 exp Social Class/  
116 exp Poverty/  
117 Income/  
118 Social class\*.mp.  
119 social determinants.mp.  
120 social status.mp.  
121 social position.mp.  
122 social background.mp.  
123 social circumstance\*.mp.  
124 socio-economic.mp.  
125 socioeconomic.mp.  
126 sociodemographic.mp.  
127 socio-demographic.mp.

128 SES.mp.  
129 disadvantaged.mp.  
130 impoverished.mp.  
131 poverty.mp.  
132 economic level.mp.  
133 assets index.mp.  
134 income\*.mp.  
135 or/101-134  
136 Social Stigma/  
137 social capital/  
138 Social Control, Informal/  
139 exp Social Support/  
140 exp Social Environment/  
141 Trust/  
142 Social conditions/  
143 Social isolation/  
144 Social marginalization/  
145 Anomie/  
146 social participation/  
147 social exclusion.mp.  
148 (social adj (capital or cohes\* or organis\* or organiz\*)).mp.  
149 (community adj3 (cohes\* or participa\*)).mp.  
150 ((neighbourhood or neighborhood) adj cohes\*).mp.  
151 social relationships.mp.  
152 social network\*.mp.  
153 collective efficacy.mp.  
154 civil society.mp.  
155 informal social control.mp.  
156 neighbo\*rhood disorder.mp.  
157 social disorgani?ation.mp.  
158 anomie.mp.  
159 social support.mp.  
160 social participation.mp.  
161 trust.mp.  
162 emotional support.mp.  
163 psychosocial support.mp.  
164 community capital.mp.  
165 neighbo\*rhood cohesion.mp.  
166 social influence.mp.  
167 (soci\*context\* or soci\*-context\*).mp.  
168 or/136-167  
169 Health Status Disparities/  
170 Health Services Accessibility/

171	Health Equity/
172	health*care disparit*.mp.
173	health care disparit*.mp.
174	health status disparit*.mp.
175	health disparit*.mp.
176	health inequalit*.mp.
177	health inequit*.mp.
178	medically underserved.mp.
179	or/169-178
180	28 or 72 or 77 or 89 or 97 or 100 or 135 or 168 or 179

Remote consultations search terms

1	Telemedicine.mp.
2	"Tele* Consult*.mp.
3	"*phone* Consult*.mp.
4	exp Telemedicine/
5	exp Remote Consultation/
6	Teleconsult.mp.
7	Telehealth.mp.
8	ehealth.mp.
9	tele-health.mp.
10	tele-medicine.mp.
11	or/1-10

Primary care search terms

1	primary care.ti,ab.
2	primary health.ti,ab.
3	family physician*.ti,ab.
4	general practi*.ti,ab.
5	family practi*.ti,ab.
6	outpatient?.ti,ab.
7	clinic?.ti,ab.
8	ambulatory.ti,ab.
9	health centre?.ti,ab.
10	office.ti,ab.
11	or/1-10

Combined search strategy: [Health inequalities line] 180 AND [remote consultations line] 11 AND [primary care line] 11