

Appendix PDF 1: Final Twitter query terms

category	language	keyword	English translation or explanation (if necessary)
General keywords	all		
		worldimmunizationweek	vaccination hashtag
		immunizationweek	vaccination hashtag
		vaccineswork	vaccination hashtag
		vaccineapartheid	vaccination hashtag
Vaccine producers and brands	all		
		pfizer	
		moderna	
		biontech	
		vaxzevria	New name for the Astrazeneca vaccine
		astrazeneca	
		azn	Abbreviation
		az	Abbreviation
		jj	Abbreviation
		j&j	Abbreviation
		johnson & johnson	
		johnson&johnson	
		curevac	
		covax	
	Danish		The Danish search terms are chosen to capture tweets related to the practicalities surrounding getting a vaccine and include words relating to booking the vaccine, side effects, vaccine 'lines', vaccine plans/calendars, and getting the shot/dose, in addition to the debate around the vaccine pass and terms relating to vaccine scepticism.
		vaccinebivirkninger	Vaccine side effects
		vaccinervirker	Vaccines work!
		coronavaccine	corona vaccine

		vaccinedk	reference to website
		vaccinested	vaccination 'place'/'location'
		overskuds vaccine	Vaccine surplus
		astrazeneca-vaccine	
		stik	shot
		dose	dose
		doser	doses
		plandemi	'plandemic'
		vaccinekø	vaccine line
		vaccinekøer	vaccine lines
		vaccinekøen	the vaccine line
		bivirkninger	side effects
		vaccineres	[getting] vaccinated
		vaccination	a vaccination
		coronapas	corona pass(port)
		vaccinepas	vaccine pass(port)
		vaccine program	vaccine program
		vaccineprogram	vaccine program
		vaccine-program	vaccine program
		vaccineplan	vaccination plan
		vaccine-kalender	vaccination calendar
		vaccinekalender	vaccination calendar
		vaccine	
		antivax	
		anti-vax	
		anti-vaxxer	
		vitt	Vaccine-induced Thrombotic Thrombocytopenia (the kind of blood clot that the AstraZeneca vaccine is suspected to induce)
		cvt	Cerebral Venous Thrombosis (the kind of thrombosis that some vaccines are suspected to cause)

	German		<p>Note: A lot of these words are usually spelled with a capital first letter in German, but since the Twitter API does not distinguish between upper- and lowercase words, we included the lowercase version of each word here.</p> <p>The German search terms were chosen similar to the Danish and Polish ones: They capture words related to practicalities, side effects, and the vaccination passport.</p>
		impfung	vaccination
		impfungen	vaccinations
		impfpass	vaccination passport
		impf	vaccin (word stem)
		impfen	vaccinate
		geimpft	vaccinated
		geimpfte	vaccinated
		geimpften	vaccinated
		impfneid	vaccination envy
		impf-priorisierung	vaccination prioritisation
		prio	prioritisation
		priorisierung	prioritisation
		priogruppe	prioritisation group
		impf-reihenfolge	vaccination order
		impf-einladung	vaccination invitation
		impf-priorität	vaccination priority
		coronaimpfung	corona vaccination
		erstgeimpften	having gotten the first shot
		erstimpfung	first shot
		erstimpfungen	first shots
		zweitdosis	second dose
		zweitimpfung	second shot
		zweitgeimpft	having gotten the second shot
		ärmelhoch	"pull up your sleeve" (German spelling with umlaut)

	aermelhoch	"pull up your sleeve" (German spelling without umlaut)
	impfpflicht	compulsory vaccination
	impfzwang	compulsory vaccination (the word "Zwang" is stronger than pflicht and it is used to negatively refers to forcing someone to do something)
	plandemie	plandemic (pun consisting of the words plan and pandemic)
	impfkommission	"vaccination committee" in Germany
	stiko	abbreviation for the "permanent vaccination committee" in Germany
	impfenschützt	vaccination helps, a hashtag used on German Twitter (German spelling with umlaut)
	impfenschuetzt	vaccination helps, a hashtag used on German Twitter (German spelling without umlaut)
	covid19impfung	Covid-19 vaccination
	impfschutz	protection by vaccination
	astra	abbreviation for the AstraZeneca vaccine
	astraz	abbreviation for the AstraZeneca vaccine
	thrombose	thrombosis
	thrombosen	thromboses
	sinusvenenthrombose	cerebral venous sinus thrombosis
	blutgerinnsel	blood clot
	dosis	dose
	dosen	doses
	impfdosis	vaccine dose
	impfdosen	vaccine doses
	impfgerechtigkeit	vaccination equality
	impfnebenwirkungen	vaccine side effects
	nebenwirkungen	side effects
	impfstoff	vaccine
	impfstoffe	vaccines
	impfstoffes	vaccine
	impfstoffen	vaccines
	impfstoffs	vaccine

		impfstoffdosen	Vaccine doses
		impfstoffmangel	vaccine scarcity
		impftermin	vaccination appointment
		impftermine	vaccination appointments
		impfzentrum	vaccination centre
		impfzentums	vaccination centre
		impfzentren	vaccination centre
		impfpatent	patent for vaccine
		mrna	mRNA
		titer	titer
		kreuzimpfung	“cross vaccination”, mixing of different brands for the first and second shot
		durchgeimpft	fully vaccinated
		vakzin	vaccine
		vakzine	vaccines
		biontec	variation of the spelling of the Biontech vaccine
		comirnaty	vaccine brand
		astrazeneka	wrong spelling of AstraZeneca (which was found to be used by some Twitter users)
		astrazenica	wrong spelling of AstraZeneca (which was found to be used by some Twitter users)
		bnt	abbreviation of Biontech
		impfteam	vaccination team
		covaxin	vaccine brand
		johnsonjohnson	variation of Johnson & Johnson
		impfausweis	vaccination proof
		impfstatus	vaccination status
		impfschema	vaccination scheme
		impfreaktion	vaccine reaction
		vaxxer	vaxxer
		impfkommission	vaccination committee

		schutzimpfung	immunisation, vaccine
		impfquote	vaccination quota
		impfabstand	vaccination interval
		zwangsimpfung	forced vaccination
		impfberechtigt	eligible to get vaccinated
		impfprivilegien	vaccination privilege
		impfwirkung	vaccination effect
		coronaschutzimpfung	corona vaccine
		ungeimpften	unvaccinated
		verimpft	inoculate
		impfenrettetleben	vaccinations save lives
		impflinge	people who have gotten vaccinated
		sanofi	vaccine brand
		impfstopp	vaccination stop
	Polish		The terms mainly refer to the practicalities of booking the vaccination date and getting the first or second dose of the vaccine. Some specific terms refer to potential negative health effects of getting vaccinated (side effects) and the debate on vaccination itself, specifically recent focus on “corona passports” and critical approach to public health measures designed to control the pandemic.
		szczepionki	vaccinations
		szczepienia	vaccinations
		szczepienie	vaccination
		szczepionka	vaccine
		szczepienia	vaccinations
		szczepić	To vaccinate
		szczepień	vaccinations
		zaszczepieni	vaccinated
		szczepionek	vaccines
		zaszczepionych	Vaccinated persons

		zapisany	registered (masculine form of adjective)
		zapisana	registered (feminine form of adjective)
		zapisani	registered (plural form of adjective)
		zapisy	registrations
		zapis	registration
		rejestracja	registration
		zaszczepiony	vaccinated (masculine form of adjective)
		zaszczepiona	vaccinated (feminine form of adjective)
		zaszczepieni	vaccinated (plural form of adjective)
		nieżaszczepieni	not vaccinated
		nieszczepieni	not vaccinated
		niezaszczepionych	(of) not vaccinated persons
		nieszczepionych	(of) not vaccinated persons
		zaszczepione	vaccinated persons
		zaszczepią	(they will) vaccinate
		zaszczepię	(I will) vaccinate
		wyszczepieni	fully vaccinated persons
		wyszczepionych	(of) fully vaccinated persons
		dawka	dose
		dawką	with a dose
		pierwsza dawka	first dose
		druga dawka	second dose
		Pierwszą dawką	with a first dose
		drugą dawką	with a second dose
		szczepionka	vaccine
		szczepionki	vaccines
		zastrzyk	injection

		zaczepiony	
		zaczepiona	microchipped playful, ironic way of referring to self as vaccinated person, mostly used by persons with positive attitude towards vaccines(masculine, feminine and plural form of adjective)
		zaczepiani	
		pfizerem	
		pfizera	pfizer
		modernę	moderna
		moderną	with moderna
		astrazenekę	astrazeneca
		astrazeneki	of astrazeneca
		strazeneką	with astrazeneca
		terror szczepionkowy	vaccination terror (expression used by vaccination-skeptics to refer to government regulations which give privilege to vaccinated persons)
		przymus szczepionkowy	vaccination compulsion
		zamordyzm szczepionkowy	Vaccination compulsion (pejorative)
		szczepić	to vaccinate
		nop	abbreviation for “adverse vaccine reaction”
		nopów	adverse vaccine reactions
		paszport szczepionkowy	vaccination passport
		paszporty szczepionkowe	vaccination passports
		odporność zbiorowa	herd immunity
		szczepimysię	“let’s get vaccinated” - hashtag used by public authorities to promote the vaccination campaign. Usually used in all official messages on vaccination.
		nieszczepimysię	“let’s not get vaccinated” - hashtag used by vaccination-skeptics
		zaszczepięwmajówkę	“Get vaccinated during May weekend” - official hashtag used by public authorities to promote the vaccination campaign that was organized during so-called “Long weekend of May” (May 1st and May 3rd are Polish national holidays) - mobile vaccination points serving one-dose J&J vaccine have been set up by government in 16 major Polish cities.
		paszportszczepionkowy	vaccination passport - hashtag, mainly used in anti-vaccination context
		nieszczepięsię	“I will not get vaccinated” - hashtag used by vaccination-skeptics
		szczepienia działają	“vaccinations work” - hashtags used by pro-vaxxers

		odpornośćbiorowa	"herd immunity" hashtag. Mostly used by pro-vaxxers
		młodzisiejszczepią	"Youth gets vaccinated" - hashtag used by official governmental campaign promoting vaccination of youth

Appendix PDF 2: hSBM and LDA topic models results

1. hSBM (25 most frequent topics, ordered by prevalence)

Denmark					
Topic no.	Words	English translation	Topic name	Is the topic meaningful ?	Description
7	'up', 'ishøj', 'kriminell', 'straf', 'bygge', 'udlænding', 'km', 'information', 'sputnik', 'fraråde'	up ishøj criminal penalty to build foreigner km information sputnik to advise against	Meaningless topic: Not vaccine related	No	Not vaccine related tweets, most of them in other languages (and really short)
1	'eksempel', 'dumme', 'konkret', 'ta', 'frederik', 'saglig', 'ad', 'blå', 'tysk', 'fremgå'	example stupid concrete ? Frederik objective eww blue german appear as	Meaningless topic: random tweets	No	About using bad examples in arguments, perhaps not being concrete or objective enough Most tweets were links, in english or didn't look to be either a part of a discussion or specifically about the tweet
5	'se', 'bare', 'nå', 'godte', 'give', 'tro', 'tak', 'nej', 'læge', 'rette'	to see only ? treat to give trust/believe thank you no doctor to correct	Meaningless topic: Spam tweets	No	Looks like a bot, mostly tweeting 'Hpbd'
4	'vaccine', 'bivirkning', 'pfizer', 'år', 'stor', 'ja', 'folk', 'sige', 'skrive', 'stå'	vaccine side effect pfizer year big/huge yes people to say to write to stand	Vaccine surplus waitlist	Yes	People have signed up for the waitlist to receive the suspended Astrazeneca and J&J vaccines
0	'tag', 'covid', 'unge', 'mod', 'dø', 'barn', 'tage',	to take covid young against to die child to take	Vaccination of children	Yes	Debate on whether the youth should be vaccinated, some for, some against.

	'kende', 'menneske', 'alvorlig'	to know human serious			
10	'vaccination', 'gå', 'to', 'gang', 'moderna', 'komme', 'blive', 'sidste', 'vente', 'holde'	vaccination to go two time(s) ??? moderna to come become/stay last/final to wait to hold	Moderna	Yes	Tweets about appreciating getting the moderna vaccine. The words seem more random in comparison to the teets and lemmas
11	'først', 'først_stik', 'få_først', 'få_stik', 'bestille', 'første', 'invitation', 'fik', 'bestille_tid', 'ømme'	first/firstly first_injection get_first get_injection to book first invitation got book_appoint ment sore	First vaccine shot excitement	Yes	Very meaningful, perhaps among the most meaningful topics People that are excited about either having gotten their first vaccine shot (and feeling a bit sore, but happy) or having it scheduled
8	'stik', 'få', 'dag', 'uge', 'tid', 'morgen', 'juni', 'region', 'invitere', 'færdigvaccine ret'	injection to get day week appointment tomorrow june region to invite fully vaccinated	Time of first vaccine shot	Yes	When people had or expected to get their vaccine shots, focussed around temporal aspects.
3	'vaccinere', 'helt', 'smitte', 'bruge', 'risiko', 'god', 'rigtig', 'vise', 'lang', 'slette'	to vaccinate quite/surely to infect to use risk good right to show long to erase/delete	Doubts & Questions	Yes	Questions and doubts on statistics, vaccine differences, and vaccine sceptics The topic is better understood through reading the tweets and lemmas
9	'coronapas', 'test', 'teste', 'positiv', 'fredag', 'gyldig', 'slippe', 'negativ', 'mundbind', 'stadion'	corona pass test to test positive friday valid to drop???? negative facemask stadion	Corona passport	Yes	On the corona passport, especially in relation to an article about restaurants not checking enough Most of the representative tweets refer to the same article (with the same header), which is also evident in the leamms
15	'jj',	johnson &	International	Yes	International perspective on

	'az', 'data', 'eu', 'vitt', 'tal', 'ca', 'tilfælde', 'az_jj', 'usa'	johnson astrazeneca data EU VITT number approx. case astrazeneca_j ohnson&johns USA	outlook		both the use of vaccines in other countries, the common european covid-19 passport, and the travel industry. While the 'international' aspect is shared, the subtopics differ a bit
2	'the', 'gt', 'by', 'of', 'on', 'and', 'is', '#', 'læs', 'ik'	the ? ? ? ? ? ? to read ?	Meaningless topic: English words	No	Some Eurovision reference, some Preben Elkjær, majority not vaccine-related
6	'#dkpol', 'dk', '#covid', '#covid_dk', '#dkmedier', '#vaccine', '#sundpol', '#coronapas', 'booke', 'tur'		Vaccine appointments	Yes	Booking appointments for getting vaccinated The hashtags are the most representative words, however they do not convey a lot of meaning of the content of the most representative tweets
12	'johnson', 'dose', 'astrazeneca', 'lov', 'johnson_johns on', 'boris', 'boris_johnson', 'enhedslisten', 'regeringen', 'britisk'	johnson dose astrazeneca law johnson_johns on Boris Boris_Johnson Name of the Danish communist party the government British	Meaningless topic: Article links (duplicates)	No	Duplicate tweets of two articles, one on Boris Johnson, one related to 'Enhedslisten'
13	'dosis', 'mio', 'pr', 'færdig', 'sen', 'antal', 'opdatere', 'curevac', 'plan', 'juli'	dose million per ready late quantity update curevac plan july	Status on vaccine plan	Yes	How the numbers are looking in relation to the amount of people who have received their shots and the amount of vaccine doses Denmark have received.
17	'dansker',	Dane	Meaningless	No	Mostly about Preben Elkjær,

	'skrotte', 'tusind', 'stå_kø', 'frivillig_vaccin e', 'kommune', 'hospital', 'skrotte_vaccin ere', 'periode', 'dansker_få'	scrap thousand stand`_line voluntary_vacc ine commune hospital scrap_to vaccinate period Dane_get	topic: Random topic and duplicate links		some housing listings, some article-link duplicates
18	'big', 'farma', 'big_farma', 'meste', 'langt', 'istedet', 'forebygge', 'vaccine_hold 'e', 'stor_penge', 'medicin_medi cin'	big pharma big_pharma most long instead to prevent vaccine_keep big_money medicine_medi cine	Meaningless topic: Mostly non-danish links	No	Only 1 vaccine-related tweet(but duplicated), rest are non-danish
16	'resultat', 'team', 'øvrig', 'team_megler', 'megler', 'bli', '#leiamcenma pv_team', '#leiamcenma pv', 'sol', 'led'	result team otherwise ?? ?? ?? ?? sun led	Meaningless topic: Not vaccine-relate d	No	All spam, no meaningful content
19	'stik_modsætt e', 'status', 'holdt', 'hesitancy', 'vaccine_hesit ancy', 'weekend', 'se_fremme', 'influencer', 'beklager', 'udrulning'	opposite status stopped hesitancy vaccine_hesist ancy weekned see_ahead influencer apologies roll out	Anti-vaccine	Yes	People claiming that other twitter users are 'vaccine hesitancy influencers'. Other people talk about the corona passport in terms of a 'surveillance state', referring to the danish prime minister as 'Mettemao'. Some of the tweets and lemmas seem misplaced, but in general the words, tweets, and lemmas form a topic.
20	'It', 'gt_gt', 'dilt', 'jordi', 'hos_læge', 'dilt_jordi', 'udtag', 'jordi_dilt', 'england', 'troede'	? ? ? ? at_doctor ?? withdraw??? ?? England believed	Meaningless topic: Random topics grouped together	No	Soccer tweets, immigration tweets, spam tweets

14	'sårbar', 'jævnaldrende', 'done', 'vaccinestik', 'with', 'rose', 'årig_årig', '#nyheder', 'seneste', 'prioritere'	vulnerable peers done vaccine injection with rose year old_year old #news latest to prioritize	Vaccine queue		About who is getting prioritized in the vaccine plan, especially the 'vulnerable' and elderly. Some weird tweet got in there, it has nothing to do with the rest of the tweets
Germany					
Topic no.	Words	English translation	Topic name	Is the topic meaningful ?	Description
3	impfung mal einfach arzt finden stehen eigentlich monat nehmen problem	vaccination sometimes simply doctor (to) find (to) stand actually month (to) take problem	Neutral vaccination tweets	Yes	General mentions and comments on the Covid-19 vaccine.
14	sehen geben frage bleiben schützen brauchen bitte genau Denken wissen	(to) see (to) give (to) ask (to) stay (to) protect (to) need please exactly (to) think (to) know	Meaningless topic - verbs	No	Mostly tweets that contain very few words and almost no corona or vaccine-related words.
4	impfungen mensch corona covid deutschland fall leben virus pandemie zeigen	vaccination human (being) corona covid Germany case (to) live, life virus pandemic (to) show	Covid-19 vaccination	Yes, but an ambiguous topic.	Short tweets that almost exclusively contain the word 'vaccination'. Mixture of pro- and anti-vaccine tweets.
24	hab leute erhalten ne frau nix echt paar fühlen freuen	I have people (to) receive A (slang word) woman nothing really a couple (to) feel (to) look forward / (to) be joyful	Meaningless topic: Not vaccine-related	No.	The words seem to be mostly unrelated to what is shown by the most predictive words.

37	geimpfte geimpft ungeimpften test gelten anstecken infizieren herbst weiterhin ungeimpfte	vaccinated vaccinated unvaccinated test (to) apply, (to) be valid, (to) be in place (to) infect autumn Still unvaccinated	Vaccinated vs. unvaccinated people	Yes.	About the freedoms and rights that vaccinated people enjoy. Some tweets also just state that people got the vaccine.
1	impfen urlaub familie dennoch gesellschaft mögen verantwortung sohn zweimal impfen_mal	(to) vaccinate vacation family nevertheless society (to) like responsibility son two times vaccinate_time s	Excitement	Yes	Users are excited that they recently got vaccinated.
19	dosis az erstimpfung gestern zweitimpfung ca stunde impfreaktion jj reaktion	dose abbreviation for the AstraZeneca vaccine first vaccination yesterday second vaccination approximately hour vaccine response, side effect abbreviation for the Johnson & Johnson vaccine reaction	First and second shot	Yes	Users discuss the first and second shot of their vaccine. They are excited about having gotten it. The topic also suggests a discussion about side effects, but this didn't surface in the 10 most representative tweets of this topic.
28	erwachsen impfen_rest freuen_impfen hr verurteilen nunmal aufrecht_erhal ten aufrecht wünsch mal_dran	adult vaccinate_resi dual rejoice_vaccin ate Hr, probably the abbreviation for 'Herr' (mister) condemn well uphold, maintain upright wish times_there	Meaningless topic: Not-vaccine related	No	Words are not really related and the tweets seem to be random tweets that do not discuss corona or the Covid-19 vaccine.

15	impfstoff studie zulassung zulassen ema wirksamkeit verwenden curevac ergebnis impfstoff_kind	vaccine study approval admit EMA (European Medicines Agency) efficacy use curevac result vaccine_child	Approvals	Yes	Topic about the approval of vaccines and the previous study of their effectiveness.
11	bekommen woche impfzentrum nächst impfzentren dran praxis glück schnell hausärzte	get week vaccination center next vaccination centers on it practice luck fast general practitioners	Vaccination centers	Yes	Users discuss the places they can get vaccinated: mostly the vaccination centers and their general practitioners.
6	kind kind_impfen eltern erwachsene impfung_kind impfungen_kin d gefährden impfen_kind langzeitfolgen kid	child child_vaccinat e parents adult vaccination_ch ild vaccinations_c hild endanger vaccinate_chil d long-term consequences kid	Vaccination of children	Yes	Users discuss the vaccination of children. Tweets mostly mirror a sceptical stance, because the German Health Minister has urged parents to vaccinate their children against the recommendation of the German Vaccination Committee.
41	pfizer biontech_pfize pfizer_pfizer gang pfizer_gang pfizer_biontec h real pfizer_modern a astrazeneca_ moderna motivieren	pfizer biontech_pfize pfizer_pfizer gear pfizer_aisle pfizer_biontec h real pfizer_modern a astrazeneca_ moderna motivate	Brands	Yes, but tweets don't carry a lot of content in the first place.	Very short tweets that only contain vaccine names.
33	termin hausarzt warteliste anmelden liste buchen	appointment general practitioner waiting list (to) register list (to) book	Practicalities of getting an appointment	Yes	Users discuss how to best get an appointment either at a vaccination center, through waiting lists or at their general practitioner.

	anrufen termin_bekom men vergeben online	(to) call (to) get_appointme nt (to) assign online			
16	#covid #impfung #corona #astrazeneca #biontech # #impfen #coronavirus #impfungen #moderna	#covid #impfung #corona #astrazeneca #biontech # #vaccinate #coronavirus #vaccination #moderna	Meaningless topic: Hashtags	No	Topic model grouped frequently used hashtags together.
45	impfpass digital impfausweis impfnachweis digitale digital_impfpa ss nachweis eintragen app gelb	vaccination passport digital vaccination certificate vaccination certificate digital digital_vaccina tion_passport proof (to) enter app yellow	Vaccination passport	Yes	Users discuss both their physical vaccination pass (it's a little yellow booklet in Germany) and the digital passport that will be introduced soon.
7	impfzwang besiegen schwerwiegen d schweizer petition seriös eintreten bitte_mal hohe #impfreaktion	vaccination compulsion (to) defeat serious swiss petition serious (to) enter please_time high #vaccinereacti on	Anti-vaccine and anti-compulsor y vaccination	Yes	Users complain about compulsory or forced vaccination (which does not exist in Germany, but many users feel like there is indirect coercion because the vaccinated people get back many freedoms)
53	impftermine abstand #impfzentrum chip gates organisieren bill bill_gates cool vorm	vaccination dates spacing #vaccination center chip gates (to) organize bill bill_gates cool in front of	Mixed topic: Appointments and conspiracy theory	Yes, but ambiguous.	The topic is split into two themes: One is concerned with vaccination appointments, the other one with a conspiracy theory about Bill Gates inserting chips into people via vaccines.
2	lassen impfen_lassen lassen_impfen grippe	(to) let (to) let_vaccinate (to) let_vaccinate flu	Mixed: (Not) getting vaccinated	Yes, but ambiguous.	This is a mixed topic: Some users talk about getting vaccinated, but the majority states that they will not get vaccinated. Since 'not' is a stopword that was removed

	leute_impfen niemals gesundheitlich urlaub_fahren grund_impfen einfach_impfe n	people_vaccin ate never health (to) go on holiday (to) reason_vaccin ate (to) simply_vaccin ate			during preprocessing, this important distinction is completely concealed by the topic model.
32	prio warten gruppe nrw priogruppe registrieren priorität prio_impfen prio_gruppe aussicht	Abbreviation of 'priorisation' (to) wait group Abbreviation for the federal state Nordrhein-Wes tfalen prioritisation group (to) register priority (to) prioritized_vac cinate priorisation_gr oup outlook	Prioritisation	Yes	Users discuss the different priorisation groups and how to best register for an appointment.
34	land fordern deutsch weltweit spielen staat kaufen medikament impfkampagne toll	country (to) demand german worldwide (to) play state (to) buy drug vaccination campaign great	Anti-vaccine: Demanding vaccination stop	Yes	Users all link to an article that says that around 50 medical experts have demanded the stop of all vaccination campaigns globally. Most of the tweets link to far-right alternative media sources.
17	gt verabreichen insgesamt gesamt #deutschland gt_gt befinden kw #gesundheit büro	gt administer total total #germany gt_gt are kw #health office	Meaningless topic: Not vaccine-relate d	No	The tweets are all very different and most of them are not vaccine-related.
50	euro wahrheit zweit nich läuft texas erstmal verwechseln badenwürttem	euro truth second not running texas first time (to) confuse Federal state	Meaningless topic: Not vaccine-relate d	No	Doesn't have anything to do with the most predictive words and most of the tweets are not vaccine-related.

	berg zweit_erstimpfungen	of Baden-Württemberg second_first_vaccinations			
26	biontech astrazeneca moderna vakzin biontech_moderna team johnsonjohnson comirnaty impfung_biontech freude	biontech astrazeneca moderna vakzin biontech_moderna team johnsonjohnson comirnaty vaccination_biontech joy	Brands	Yes, but there is not much tweet content in the first place.	Short tweets mentioning one of more vaccine brands.
12	risiko schwer infektion nutzen gering verlauf erkranken erkrankung schwer_verlauf selten	risk heavy infection (to) benefit low course (to) fall ill disease severe_course rare	Risk assessment	Yes	Users weigh the health risks associated with a Covid-19 infection against the risk of vaccine side effects.
9	voll angst impfschutz krankheit lass voll_impfschutz ruhe komm covid_impfen lass_impfen	full fear vaccination disease (to) let full_vaccine_protection rest (to) come (to) covid_vaccinate (to) vaccinate	Fully vaccinated people	Yes	Users discuss when they will be fully vaccinated.
Poland					
8	człowiek mówić sam lekarz zdrowie robić czas powiedzieć zrobić nikt	man/human to speak alone physician health to do time to say to get something done nobody	Meaningless: not vaccine-related	No	Based on the words, and the most representative words, it is really difficult to determine the meaning of this topic. One of the most representative tweets in this topic is "I am preparing cereal".
4	zaszczepić mieć wiedzieć móc'	to vaccinate to have to know to be able	Meaningless: not vaccine-related	No	Although the words would suggest that the topic could have something to do with "getting vaccinated" or "waiting

	chyba dobry dać czekać być dostać	I guess good to give to wait to be to get			for the vaccination date”, the most representative tweets identified by the model do not have any common thread
20	pogląd regularnie trwać rok błędny , umierać_lud wspierać zaliczyć pogadać pozdrowiać_s erdecznie hvp	view/opinion regularly to last a year wron dying_peoplet o support to count as/to pass to talk to greet_warmly, hvp	Meaningless: not vaccine-relate d	No	The words in this topic cannot be considered to connect to each other in any meaningful way, as confirmed by the most represnetative tweets and lemmas identified by the model.
3	szczepionka rok bezpieczny przyjąć przejąć szczepionki producent trwać podawać znany	vaccine year safe to accept/to take to go/to go through vaccines producer to last to give known	Vaccines	Yes	Most representative tweets include both anti-vaccine statements (“It is not vaccine!”), questions; “How is the vaccine?” and positive statements “vaccine is magic!”
1	szczepienie	vaccination	Vaccination	Yes	This topic contains only one word and most representative tweets are mostly the ones that refer to getting and announcing the date of vaccination, just being vaccinated or asking other users whether they got vaccinated.
29	xd jutro czerwiec mama zapisać pfizerem jechać kolejka zaczipowana minuta	xd (popular emoticon) tomorrow june mom to sign up/register with pfizer to go/to travel queue chipped/got a chip minute	Announcing getting vaccinated	Yes	Users announcing in Twitter that they got vaccinated or will do so shortly (they have registered or received a date of vaccination) Most representative tweets in this topic are the short messages “chipped!” which is a playful way to refer to a popular conspiracy theory on microchips in vaccines.
15	dawka drugi pierwszy drugi_dawka pierwszy_daw ka	dose second first second_dose first_dose dose_vaccine	Getting a vaccine dose	Yes	Users announcing that they got vaccinated with either first or second those of the vaccine. Most representative tweets in this topic are the ones referring to getting a first or second dose

	dawka_szczepionka ii dawka_pfizera szczepienie_d rugi spadek	ii (two/second) dose_pfizer vaccine_secon d decrease			of the vaccine, i.e.: a user announcing that he just got a first dose of vaccine, or another user asking someone announcing the fact of being vaccinated, whether it was with the first or second dose.
5	szczepić chcieć lud chcieć_szczepić polak powinien chcieć_zaszczepić lud_chcieć tv żyć	to vaccinate to want people want_vaccinate Pole should want_vaccinated people_want tv to wish	People not wanting to get vaccinated		Discussion on people not wanting to get vaccinated and decreasing willingness to get vaccinated in Polish society. The words in this topic, as well as most representative tweets selected by the model suggest that this topic concerns general discussion on people who do not want to get vaccinated. Many of these tweets are the questions (i.e. "Why we should get vaccinated?") or complaints about people who do not want to get vaccinated ("All of that is happening, because people do not want to get vaccinated").
11	choroba nowy przypadek zakażenie skuteczność ilość ryzyko mały wysoki, populacja	disease new case infection effectiveness quantity risk low/small high population	Effectiveness and risks	Yes	Theme of effectiveness of vaccines and risks associated with getting vaccinated. Some tweets in the list of most representative messages discuss the effectiveness of vaccines and refer to reports or articles. Some refer to a total percentage of the vaccinated population in Poland.
14	osoba zaszczepionych polska wielki niezaszczepionych szansa mało wieko usa wg	person vaccinated Poland huge not vaccinated chance little lid usa according to	Meaningless: random words	No	Most representative tweets suggest that tweets identified by the model are the ones discussing the effectiveness of Polish vaccination program, however it is hard to determine why some of the words are associated with this topic, and it is hard to determine a common theme, when inspecting the whole content of representative tweets and the lemmas.
32	loteria milion nagroda wziąć	lottery million prize to take/take part	Vaccination lottery	Yes	Topic on "Vaccination lottery" that was announced by the Polish government on May 25.

	brać udział wygrać samochód zachęcić hulajnoga	to take/take part participation to win car to encourage scooter			In order to encourage people to get vaccinated, the government has announced a special promotional campaign – people who will get vaccinated automatically enter a lottery program, with the possibility to win hybrid cars, electric scooters and money prizes.
22	zaszczepieni zaszczepiony zaszczepiona pewnie kurwa jesteś zarazić głupi głupota zarażać	vaccinated vaccinated vaccinated I guess whore (most popular swear word used in Poland) you are to infect stupid stupidity to infect	Meaningless: random tweets	No	Although some of the representative tweets and words identified by the model suggest that tweets in this topic might refer to a conflict between pro- and anti-vaxxers and discussions on whether it is worth to vaccinate if it does not prevent from carrying the virus and in consequence infecting other people, some of the most representative tweets are the ones where user announces getting the vaccine. It is hard to identify a prevailing theme in this topic.
62	ręka czuć boleć głowa gorączka bola noc lewy lekki	arm to feel to ache head fever pains night left light/slight	Short-term symptoms after vaccination	Yes	Topic discussing immediate short-term unpleasant symptoms occurring after vaccination. All words and most representative tweets in this topic refer to short-term symptoms occurring after getting a dose of vaccine, like pain in a spot where the vaccine was injected, headache, fever etc.
7	wirus działać grypa skuteczny zachorować chorować mutacja zagrożenie naturalny	virus to work flu effective to get sick to be sick mutation danger/threat natural	Harmful side effects of vaccines	Yes	Discussing the harmful effects of vaccines, often referring to false/doubtful scientific claims. Negative sentiment towards vaccines Most of the representative tweets identified by the model are the users discussing cases of disease and death among vaccinated persons, as well as claims that vaccinated persons are dangerous, as they spread the virus. It appears that there are a lot of retweets
39	rząd polaki	government	Government initiatives and organization of	Yes	Discussions on the governmental campaigns for promoting vaccines and

	akcja polski kasa pis pomysł obywatel zachęcać promocja	Poles (incorrect, offensive form) action polish money (pejorative) abbreviation for the name of the ruling party idea citizen to encourage promotion	vaccination campaign		encouraging Polish people to get vaccinated.
13	grupa umierać nop dana podać śmiertelność konto źródło mz kłamstwo	group to die abbreviation for an undesirable post-vaccinatio n reaction given to give mortality account source abbreviation for Ministry of Health lie	Undesirable post-vaccinati on reactions	Yes	Topic refers to the theme of post-vaccination reactions (such as blood clots) and discussion on whether the government is manipulating the data on the number of reported side-effects occurring among vaccinated persons. Post-vaccination reactions are very often discussed in context of how the Government is manipulating the data. Usually this is discussed by vaccine-skeptics.
57	szczepić szczepionke szczepien zaszczepić sputnik reka moge osob chca troche	to vaccinate vaccine vaccinations to vaccinate sputnik arm I can persons want a bit/a little	Meaningless: Random tweets	No	It is difficult to identify a common thread in the tweets assigned to this topic. Some tweets refer to criticism of the government and organization of the vaccination program and accusations of 'shameless propaganda', however there are also tweets that do not carry any meaning.
50	maseczka służba służba_zdowie zdrowotny zapłacić nosić ofiara rosyjski sekcja nowotwór	facemask service service_health health to pay, to wear victim russian (adj.) autopsy/sectio n cancer	Meaningless: Random tweets	No	Tweets in this topic do not seem to carry a common theme, however words in this topic suggest a theme of effectiveness and efficacy of Polish health service.
0	umrzeć naprawdę groźny lewa wypadek zabić	to die for real/really dangerous left accident to kill	Meaningless: Random words	No	The representative tweets selected by the model appear to refer to the statement made by Jarosław Kaczyński, who said in the interview, that "vaccines are necessary and not harmful at

	śmiertelny kaczyński zwykły woda	deadly surname of the ruling party leader ordinary water			all". Most of the tweets are ironic responses to this statement
33	podjąć fundusz średnia podjąć_decyzj a kompensacyjn y angielski decyzja_szcze pień aktywny unikać	to take fund average take_decision compensatory English decision_vacci nation active to avoid	Meaningless: Random tweets	No	Although the words might suggest a theme of compensatory funds for people suffering from side-effects of vaccines, the tweets selected as most representative do not refer to such a topic at all.
28	iść droga swoją zgoda poczekać rada siedzieć wynieść zamiar parę	to go road/way own consent to wait advice/council to sit to amoun to intention a few/a couple	Meaningless: Not vaccine related	No	Totally meaningless
38	prosty ostatni ozdrowienie dwa ostatni_prosty maska spokój dwa_dawka zaszczepie zakładać	straight/simple last/final convalescent two final_straight mask/facesma k calm/peace to vaccinate to assume/to put on	Meaningless: Random tweets	No	It partly seems to refer to hashtag #ostatniaprosta ("final straight") used by the Polish government to promote vaccines. Lemmas and words seem to be partly connected with the topic, similarly as some of the most representative tweets.
23	tydzień pfizera pfizer astrazeneca moderna jj astra moderny aster moderną	week pfizer pfizer astrazeneca moderna abbreviation of johnson&johns on abbreviation of astrazeneca moderna abbrevaiton of astrazeneca with moderna	Taken/availabl e vaccinations/ which vaccine to take	Yes	Topic discussing Types of vaccines taken by vaccinated persons. Tweets in this topic appear to be mostly messages discussing which vaccine user was or is about to be vaccinated with (i.e. "Moderna, and you?", "Astra or Pfizer?", "Pfizer like me!"
46	mln liczba pełnić	million number fulfil/perform	Epidemic in official numbers	Yes	Numbers of Poles who died of covid/were infected/were vaccinated.

	dawką mieszkaniec pełnić zaszczepionych	with a dose inhabitant fully vaccinated (spelled with an error)			Most tweets in this topic refer to numbers of covid-related deaths and new infection cases in districts (probably posted by Ministry of Health or local Sanitary inspectorates), but also to numbers of fully vaccinated persons or vaccinations performed in districts.
	wynosić wykonano zaszczepiono mln osoba	to amount to done/performed been vaccinated million persons			
6	zgon zemrzeć śmierć powód powikłanie przyjęcie przyczyna poszczepienny związek podanie	decease to die death cause complication admission cause postvaccinal association administration (e.g. of vaccine)	Deaths and complications after receiving the vaccine	Yes	Topic refers to deaths of vaccinated persons and postvaccinal complications. Most representative tweets selected by this model are mostly anti-vaxxers tweets claiming that the proportion of vaccinated persons who died is higher than of those infected with covid.

2. LDA (five most frequent topics, ordered by prevalence)

Denmark					
Topic no.	Words	English translation	Topic name	Is the topic meaningful?	Description
20	stik vaccinere vaccine coronapas uge gå få dag #dkpol godte	stik vaccinate vaccine coronapass week walk get day Treat	--	No	The majority of all words appear in all of the topics, hence they cannot be meaningfully separated from each other
18	vaccine stik få jj tid gang gå bare pfizer først	vaccine shot get jj appointment time walk jusst pfizer firstly	--	No	The majority of all words appear in all of the topics, hence they cannot be meaningfully separated from each other
3	stik først vaccinere få vaccine dag først_stik pfizer	shot firstly vaccinate get vaccine day first_shot pfizer	--	No	The majority of all words appear in all of the topics, hence they cannot be meaningfully separated from each other

	uge coronapas	week coronapass			
13	vaccine stik coronapas dag vaccinere give se år først få	vaccine shot coronapass day vaccinate give see year firstly get	--	No	The majority of all words appear in all of the topics, hence they cannot be meaningfully separated from each other
16	få vaccine først bivirkning coronapas stor vaccinere stik vaccination jj	get vaccine firstly side effects coronapass big vaccinate shot vaccination jj	--	No	The majority of all words appear in all of the topics, hence they cannot be meaningfully separated from each other
Germany					
Topic no.	Words	English translation	Topic name	Is the topic meaningful?	Description
17	impfen kind impfstoff impfungen mensch einfach biontech woche nebenwirkung impfung	(to) vaccinate child vaccine vaccinations human simply biontech week side effect vaccination	--	No	Random topic about several vaccine themes: the vaccination campaign in Sweden, how well the vaccines work, vaccination in China and Russia, vaccine-sceptical tweets
10	impfung impfen kind impfstoff geimpft nebenwirkung geimpfte mal woche impfpass	vaccination (to) vaccinate child vaccine vaccinated side effect vaccinated times week vaccination passport	--	No	Random topic with a lot of different themes: the German Vaccination Committee, the prioritisation, vaccination in other countries.
5	impfen impfstoff kind geimpft impfung biontech geimpfte impftermin person corona	(to) vaccinate vaccine child vaccinated vaccination biontech vaccinated vaccination date person corona	--	No	There are several themes: The fact that the AstraZeneca vaccine is cheaper than others, vaccination of children, side effects

49	impfen lassen Impfen_lassen kind land impfstoff impfungen mal impfung nebenwirkung	vaccinate let let_vaccinate child country vaccine vaccinations times vaccination side effect	--	No	Several themes: Side effects, vaccination of children, risks associated with the vaccine and Covid-19, the percentage of people who have been vaccinated so far.
33	impfen impfungen impfung deutschland biontech kind impfstoff bekommen astra mensch	(to) vaccinate vaccinations vaccination germany biontech child vaccine (to) get astra human	--	No	Several themes: mRNA vaccines, conspiracy theories, vaccination of children.
Poland					
Topic no.	Words	English translation	Topic name	Is the topic meaningful?	Description
14	szczepienie osoba szczepionka covid dawka rok grupa zaszczepionych człowiek dzień	vaccination person vaccination covid dose year group vaccinated man/human day	--	No	Mostly iterations of words 'vaccine' and 'vaccination' and some related terms. However no specific topic can be identified.
11	szczepienie szczepionka dawka zaszczepić covid osoba móc mieć mln punkt	vaccination vaccine dose to vaccinate covid person to be able to have million point	--	No	
8	szczepienie szczepionka zaszczepionych zaszczepić szczepić człowiek covid osoba czuć dawka	vaccination vaccine vaccinated to vaccinate to vaccinate man/human covid person to feel dose	--	No	
34	szczepienie szczepionka osoba mieć	vaccination vaccine person to have	--	No	

	covid człowiek zaszczepić dawka zaszczepionych wirus	covid man/human to vaccinate dose vaccinated virus			
17	szczepienie szczepionka dawka drugi szczepić zaszczepionych osoba covid zaszczepić lud	vaccination vaccine dose second to vaccinate vaccinated person covid to vaccinate people	--	No	

Appendix PDF 3: Codebook

1. Classification of attitudes towards vaccines:			
Code	Definition/ When to use	When not to use	Examples (translated to English)
Pro	Clearly positive attitude towards vaccines expressed in the text, announcing getting vaccinated.	If text refers to act of being vaccinated, but the tweet is topically on something else (i.e. "Got a vaccine yesterday, my arm hurts like hell", "Just Got my injection, now off to bed - big day tomorrow. Have to be ready", "just got vaccinated - no side effects. Konfederacja [name of the party] is still mine main choice")	<p>*Finally vaccinated xd"</p> <p>"Moreover, without vaccinations, few more promiles would have died.You ask, why do we need vaccines? We need it because it is the best way to save human lives and the economy. All countries in the world that can afford it, conduct mass vaccinations."</p> <p>"Facts speak for themselves. Vaccines are effective. Examples of Israel, UK and USA are selfexplanatory.There is no need to discuss it at all".</p> <p>"Week after the first dose, and counting! Coming back to normalcy requires Covid-19 vaccinations, so every young person should get vaccinated!"</p>
Anti	Clearly negative attitude towards vaccine expressed in the text	If the text refers to narratives explored by anti-vaxxers, but does not clearly express agreement: "Many believe that vaccines are ineffective", "Is it the truth, that vaccines can cause new mutations?", "Does anyone have reliable data on how many people died after being vaccinated?"	<p>"Paranoia and disgrace! And it is (oh, ironically!) - as predicted - those "vaccinated" may pose a threat to others"</p> <p>"They are hacking your immune system this way, our dna - it's like hacking your computer. One more thing- it seems that vaccinated are a threat to the unvaccinated, not the other way around"</p>
Neutral	Content refers to vaccines, but none clear positive or negative sentiment is expressed		"Just Got my injection, now off to bed - big day tomorrow. Have to be ready"
Other/Trash	Content is unrelated to the topic of vaccines/vaccination		<p>"Ffuck I love Liverpool I almost cried when alisson score that goal"</p> <p>"My daily dose of coffee"</p>

2. Classification of narratives:

2.1 Themes shared across countries

Code	Theme	Context/Definition	Examples (translated to English)
G	General	Tweets discussing issues related to vaccines, vaccine hesitancy and campaigns or framing vaccines as normal part of a new, post-corona', reality.	"Just Got my injection, now off to bed - big day tomorrow.Have to be ready"
XX	New	Apply this code to a distinctive narrative that was not previously identified in netnography. Add it first to the section of 'country specific narratives, with short description and an example of the tweet. If a narrative is found in all countries, it needs to be added below, after deciding on new code and definition.	
C	Conspiracy	Tweets referring to conspiracy theories, conceptualizing vaccination programs as: <ul style="list-style-type: none"> • tools to subjugate and oppress the world population; • weapon use to murder people in order to reduce the global population. Tweets referring to people vaccinated or supporting Covid-19 vaccination as 'sheep', 'slaves', not being able to think for themselves.	'I feel sorry for your loss. I myself do not know anyone who died of Covid,but I know approx. 100 convalescents. I've been sick myself, so maybe I am not that unlucky. Now if we talk about persons who died because of lockdowns and vaccines - the list grows longer and longer - unfortunately"
F	Freedom	Tweets conceptualizing Covid-19 vaccine and vaccination programs as: <ul style="list-style-type: none"> • means implemented by government to take away personal freedoms; • problem of indirect coercion/social pressure, as access to social activities/traveling will be limited for not-vaccinated persons; • resembling practices adopted by totalitarian regimes, in particular segregation of people and declining basic rights to parts of the population *sanitary segregation", "vaccine apartheid". 	'Freedom is the freedom of choice. If I choose not to get vaccinated because I'm not at risk, that's my business. You can choose the vaccination and be immune, then I will not threaten you. Everything else is some pathological definition of freedom'
N	References to Nazi Germany	Tweets specifically framing the issues of vaccines in the context of oppressive policies adopted by Nazi Germany, particularly:	'Mengele [referring to Polish Minister of Health"] calls for medical experiments on Poles. They themselves admitted yesterday that they have no guarantees from the vaccine manufacturer. Mengele did the same in Auschwitz Experiments, experiments On the cattle'

		<ul style="list-style-type: none"> • comparing vaccination passports with passports of German Jews from 1938 onwards, or documents issued to Poles during Nazi occupation of Poland; • comparing vaccinated (or nor vaccinated) people to jews (facing segregation, going for a certain death) • comparing vaccines to experiments conducted by Josef Mengele in Auschwitz 	
2.2. Country-specific themes			
Germany			
Code	Theme	Context/Definition	Examples (translated to English)
DE1	Vaccination of children	Tweets discussing the vaccination of children and weighing the risks associated with these vaccinations. Includes references to the statement of the STIKO (German Vaccination Committee) which only recommended children with underlying health issues to get the vaccine, but which advised against the vaccination of all children.	"Do you have your children vaccinated against corona? I will get vaccinated myself, but I am not sure if I can make the same decision for my children."
DE2	Effectiveness of vaccine	Tweet discussing to what extent the vaccines protect against a Covid-19 infection and for how long the vaccines might protect people against an infection.	"It is largely true that you don't transmit the infection any longer, because in the case that one should be infected, the viral load is very low. However: There is no 100% certainty and you still need to be cautious as long as not everyone has gotten the vaccine."
DE3	Side effects	Tweets discussing side effects of the vaccine. This includes both users reporting on which side effects they experience themselves, but also which side effects are known for the different vaccines by now.	"I experienced chills, fatigue, and cold symptoms immediately after vaccination for 1.5 days."
DE4	Death	This category is related to the discussion of side effects, but the tweets here specifically refer to people who died after having gotten the vaccine.	"British model dies after vaccination with AstraZeneca"
DE5	Risk assessment	Users weigh the severity of vaccine side effects against the severity of a Covid-19 infection.	"You just have to have paid attention in math a bit. Then you can calculate how high the probability is that you face severe side effects from the vaccination! Spoiler alert: very very very low!"
DE7	Prioritisation	Tweets discussing the prioritization of people in different age groups. Users debate how to get access to a vaccine and how to	"As someone in the prioritization 3 group, it is impossible for me to get an appointment for a vaccination due to the shortage of vaccines, as there are currently not even enough for all the people

		make an appointment, but also how long they had to wait before they could get vaccinated.	in prioritization 2 group!"
DE8	Being fully vaccinated	Users discuss people who are fully vaccinated as well as the first and second shot of the vaccines.	"To date, around 69,000 people [in region in Germany] received their first vaccination against COVID-19 and around 25,000 people received their second vaccination."
Denmark			
DK1	Benefits and risks of getting vaccinated	Tweets discussing general pros and cons of getting vaccinated, with focus on associated risk of adverse health effects, in comparison with risks involved with other behaviors, such as taking birth control pills	"Yes, it is probably precisely in connection with contraception, on pills, that this clause has been made. But spot on? Are you OK with your 15 year old, behind your back, taking a controversial vaccine, perhaps more dangerous than covid, that is not necessary for your child's own health?"
DK3	Vaccine development	Tweets discussing how the vaccines are developed or how they differ, especially comparing the methods (i.e mRNA)	"Just remember why it usually takes significantly longer to get a vaccine approved. It has nothing to do with the development process itself, but something to do with finances, the spread of the disease you are vaccinated against and the number of people who want to participate in the phase 1, 2 and 3 trials."
DK4	Status of vaccinations	Tweets discussing how many are vaccinated and how well we follow the plan	"Not many, I saw an overview where we were up around the 95% vaccinated in the age groups who have had the opportunity to get vaccines for a while."
DK5	Voluntary vaccines	Tweets discussing the voluntary vaccines, incl. side effects, plans, and how the government handled it	"OK? What has that got to do with Johnson and Astra, Brøstrøm himself has said that you should preferably not jump on the voluntary vaccines. You have to choose for yourself whether you are willing to take a more risky vaccine ahead of time according to my inner liberal compass?"
DK6	Vaccinating children	Tweets discussing whether children should receive the vaccine	"GOOD BLESSED MORNING 🙏 Enjoy the Light that spreads everywhere ✨🙏 Personal relief: My grandchildren do not need the experimental vaccine. Which is sent in an e-box to 15-year-olds (one does not turn 16

			until June, but has received a wax "offer" in his e-box. Message last night about NO! 🙏
DK7	Side effects	Tweets discussing the side effects, some on a hypothetical level, some from statistics, some from personal experience	"3 wave is on the way but it is by vaccine damage. When the hell is this going to stop? People get incurable damage from mrna vaccines, should the small part of the population who knows what is going on seriously storm 'Borgen' (Danish parliament) with weapons before anything happens ??? Wake the fuck up"
DK8	Vaccine prioritization	Tweets discussing who should receive a vaccination and when, i.e. by age, vulnerability, importance, etc.	"The people who are going to India to build a vaccine factory should be able to skip the queue and be offered a Pfizer. There is a little too much narrow mindedness in dk."
DK9	Fascism/communism	Tweets referring to the global society as being communistic or fascistic	"What if the corona and vaccine is war against the West's white success culture. More and more evidence suggests that corona flu has originated in a CCP laboratory. Other than that, the CCP could probably have done better if they were really trying to kill us with the flu. #Freedom #CommunismKills"
DK10	Vaccine passport	Tweets discussing 'Coronaspas', including both people who are advocating for it and people who oppose it	"Yes run out and get vaccinated because you are worried about getting sick from covid-19 If you choose the vaccine in hopes of the community opening up faster or you are just tired of testing for your Coronapass. Then skip it ❤️"
DK11	Gene therapy	Tweets talking about a medical experiment and the vaccine being a type of genetic therapy	"It is not a 'vaccine' either, but a 'gene therapy', cf. the patents. And in my eyes part of an on going genocide. Sorry if it's too violent for people; I'm so nauseatingly tired of the carnage being told from all sides that just goes on and on..."
DK12	Vaccine positivity	Tweets from people that are excited to get their shots or are happy that they've already gotten them (or some of them)	"First vaccine shot is in house. Only a little heavy, sore and warm in the arm 🍌 In 14 days 📅 then I have a corona passport 📄 And on 3/7 📅 I have finished being vaccinated ✅"
DK13	Vaccine promotion	Tweets discussing (negatively) the promotion of vaccines	"users could get a 'blue cross' or a banner showing that they have

			been vaccinated to show others that they trust the vaccines. the government could fund advertising on apps describing the benefits of vaccines."
DK14	Government mistrust	Tweets that questions the credibility and motives of the government	"And at the same time, they are now lowering the" cycle threshold "for the vaccinated, so it should look as if the vaccine is working. There have previously been reports of several vaccinated people testing positive after vaccination. It's pure manipulation."
Poland			
PL1	Political polarization	Tweets that mention vaccines in the context of Polish political polarization (e.g. liberal/conservative and pro-european/nationalist); using the topic of vaccines to express political opinion, views, support for an actor from the political scene	"the percentage of vaccinated persons shows strange correlation with proportion supporting PO [main opposition party in Poland]" "just got vaccinated - no side effects. Konfederacja [name of the party] is still mine main choice'
PL2	Organization of vaccination program	Tweets expressing disappointment with the organization of the vaccination program in Poland (long queues, being assigned to vaccination points away from home) and government's ideas for promoting vaccinations (vaccination lottery)	"My date was postponed 3 times. Is there anyone in charge of this brothel?" "Does anyone know of available dates in [name of the city]? I really do not want to travel 200 km next Thursday" "Who gets the lottery prize, if a person dies after getting the vaccine? State Treasury?"
PL3	Medical experiment / Big pharma	<ul style="list-style-type: none"> conceptualizing vaccines as medical experiments, pointing out that they are still in the clinical trial phase; expressing distrust or negative sentiment towards "Big pharma"and its influence on the political sphere; expressing negative sentiment towards physicians collaborating supporting the vaccines, accusations of being impartial/bribed/corrupted. 	<p>"How much has Pfizer spent on production of the vaccine? How much of these resources were donated by governments? How much money will it make now(vaccinations will have to be repeated?"</p> <p>"It is bullshit. Check how long it took to research and develop this. If you want to convince people to take this thing, that is not the way to go. Most of us and our kids have been vaccinated. AFAIR, it took at least 10 years to develop those vaccines though."</p> <p>"This is a new gene-altering therapy which has unknown consequences"</p>

PL4	Immediate side-effects after getting vaccinated	<p>Tweets discussing immediate negative symptoms after getting vaccinated.</p> <p>Questions on what symptoms might occur after getting vaccinated</p>	<p>'24h after vaccine, and generally my arm hurts only with rapid movements, and I do not know whether I should expect more, or is that it'</p> <p>'What should I pay attention to after vaccination, just to be sure that the situation is under control?'</p>
PL5	Fake news on vaccines	<p>Tweets quoting or replicating fake news on vaccines, containing quotes from "Nobel prize winning doctors", or "famous virologists"</p>	<p>"It is a vaccine that created new variants of virus. Virus can either die, or develop new variants, which result from vaccinations. The antibodies created by vaccines afford worse infections - Professor Lux Montagnier, Noble Prize winner"</p> <p>"Why you do not follow the guidelines from outstanding scientists - geneticists, virologists, Nobel prize winners - who warn against tragic consequences of vaccinations - severe sickness and death within 2 -4 years, and call for immediate stop of vaccination programs?"</p>
PL6	Vaccines, tests and summer holiday destinations	<p>Tweets referring to the issue of summer holidays and regulations adopted by different countries, by:</p> <ul style="list-style-type: none"> • sharing information on test or vaccine requirements in a country; • sharing information on countries opening for not-vaccinated tourists; • asking about test/corona pass policies in other countries. 	<p>"1) Even today you can travel for summer holiday without vaccination or test (Albania); 2) Even today you can travel without test, if you are vaccinated (Greece, Croatia)"</p> <p>"If someone is fully vaccinated, does that person still need to do tests before departure and at arrival?"</p> <p>"Romania is opening for Polish people and does not require tests, vaccinations or quarantines - another country, where your coronapass will be good only for wiping your ass".</p>
PL7	Death/disease by vaccines	<p>Tweets discussing cases where people (celebrities, private persons) died shortly after receiving the vaccine.</p>	<p>"On May 8 she wrote that she just got vaccinated and has a fever, on May 16 she was admitted to hospital. Yesterday we saw first reports on her death"</p> <p>"Disturbing news from USA - young people develop heart</p>

		<p>Tweets expressing uncertainty on whether vaccines might be the cause of death/sickness</p>	<p>problems after getting vaccinated"</p> <p>"34 year old Kalina Mróz is dead. Journalist of "Gazeta wyborcza" has been suddenly hospitalized. She died shortly after. Not so long ago she was reporting severe symptoms after getting the vaccine"</p>
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Appendix PDF 4: Summary of findings from semantic networks and qualitative reading of tweets

Denmark			
Cluster name	Words	English translation	Findings from qualitative analysis
Vaccine comparisons	vaccinere	to vaccinate	Majority of the tweets in this cluster revolve around comparing different vaccines – and especially on their side effects. The cluster consists of both people for and against getting the vaccine. Moreover, discussion on how the vaccines are developed or how they differ, especially comparing the methods (i.e mRNA)
	virus	virus	
	verden	world	
	vej	road	
	vedkomme (Vedkommer)	to concern	
	ældre	elderly	
	vind (vinde)	to win	
	vitt	vitt	
Miscellaneous	yes	yes	A messy cluster, however most of the tweets contain numbers, e.g. referring to ages, 'waves', 'trials' etc. Moreover, tweets on the 'status' of vaccinated people, signing up for the voluntary vaccines, and the vaccine calendar.
	vs	vs	
	ønske	wish	
	år	year	
	vurdere	to assess	
	vaccinering	vaccination	
	økonomi	economy	
	vaccine	vaccine	
	vaccinebivirkninger	vaccine side effects	
	vinde	to win	
	yay	yay	
	what	what	
	vare*		
	when	when	
	*most probably a wrong output of lemmatization.		

Corona passports	åbne	to open	The cluster consists of two main subtopics. 1. The vaccine passport, in a positive perspective and 2. Anti-vaxxers, talking about side effects, the pressure to get vaccinated to get the vaccine passport
	årsag	cause	
	valg	choice	
	vække	to wake up	
	øjne	eyes	
	vaccinen	the vaccine	
	vaccinepas	vaccine passport	
	venstre	left (political party)	
	virksomhed	business	
Anti-vaccine: government manipulation	vanvid	Frenzy	Clear anti-vax cluster, includes arguments on genetic therapy, makes references to nazi-germany, fascistic governments, government manipulation
	virke	to work/function	
	øg (øge)	(to) increase	
	vise	to show	
	variant	variant	
	øge	to increase	
	video	video	
	vaccinekalender	vaccine calendar	
	virkning	Effect	
Anti-vaccine: vaccinating children	vide	to know	Many anti-vaxx trends, they both discuss the genetic therapy aspects and how the government presses young people to take the vaccine and the 'promotion' of it in relation to the possible side effects
	virkelighed	reality	
	ændre	to change	
	xx	xx	
Anti-vaccine: risks and side effects	årgang	year	Discussion of vaccinating young people in relation to side effects, arguments for taking the shot (often to avoid getting tested all the time), whether the government is putting pressure on them to take it. Also, comparison to the risks of e.g. taking birth control
	vælge	to choose	
	årig	Year-old	
	vente	to wait	
	vist	Has/have showed	
	vurdering	assessment	

Germany			
Cluster name	words	English translation	Findings from qualitative analysis
Children	Kind	child	Overall, this cluster refers to the vaccination of children. There are several sub-themes in relation to the vaccination of children which are present in the tweets which were qualitatively coded:
	sichern	to secure	
	wichtig	important	
	schützen	to protect	<i>Risk assessment.</i> Some users point out that the risks and advantages of getting a vaccine need to be scrutinized in particular when it comes to the vaccination of children.
	stiko	abbreviation for the German Vaccination Committee	
	nutzen	to use	
	Schule	school	<i>Prioritized access.</i> Since the Pfizer/Biontech vaccine is the only one that is currently approved for children in Germany, highschool students have demanded prioritized access to this vaccine. Users comment on this demand both in reaffirming and sceptical ways.
	schwer	severe	
	verlauf	course (as in: severe course of an infection)	
	Risiko	risk	All randomly sampled tweets were Covid-19 vaccine-related, however, a couple of tweets did not specifically mention children or teenagers. The majority of the tweets are either pro-vaccine or neutral, but there is also a small number of tweets in which users emphasize their anti-vaccine stance.
	ungeimpften	unvaccinated	
	klaren	to clear	
	Jugendliche	teenagers	
	infizieren	to infect	
Miscellaneous	sagen	to say	This cluster is difficult to name or categorize since it contains a lot of different sub-themes: The tweets refer to the prioritization system to get a vaccine, to the practicalities of getting an appointment and vaccine side effects including death.
	weiß	I know	
	leben	to live	
	lassen	to let	A lot of the words in this cluster are commonly used verbs in German, such as (to) live or (to) say, and I assume that these words retrieved all kinds of tweets even though they don't discuss the same topic. Interestingly, the words (to) live and (to) die appear in this cluster and about half of the tweets discuss people dying after having gotten the Covid-19 vaccine. Some of the users communicate a clear anti-vaccine stance but these nuances are subtle and are often conveyed through the tone of a tweet.
	sehen	to see	
	lässt	He/she/it lets	
	sterben	to die	
	zahl	number	
	mensch	human	
	virus	virus	
	land	country	
	verstehen	to understand	
	liegen	to lay	

	wissen	knowledge	
	problem	problem	
	leute	people	
	krankheit	disease	
	impfungen	vaccinations	
	kennen	to know	
Vaccine effectiveness	nebenwirkung	side effect	<p>This cluster mainly refers to the effectiveness of vaccines and for how long vaccines protect against a Covid-19 infection. Users discuss fact-based as they refer to official statistics and studies published on the topic. The users also refer to the differences between the effectiveness of vaccines by different producers, such as e.g. AstraZeneca in comparison to the Pfizer/Biontech vaccine.</p> <p>However, a few single tweets also refer to other themes such as the vaccination of children or the prioritisation of people getting access to vaccines.</p>
	mrna	mrna	
	wirken	effect	
	schutz	protection	
	moderna	moderna	
	studie	study	
	zeigen	to show	
	impfung	vaccination	
	infektion	infection	
Being fully vaccinated	vollständig	complete	<p>The cluster mainly refers to people being fully vaccinated. In that context the Johnson&Johnson vaccine is often mentioned in comparison to the other vaccines currently available since there is only one shot of the J&J vaccine required in order to be fully vaccinated.</p> <p>This theme appears in the vast majority of tweets we sampled from this cluster.</p>
	person	person	
	johnson	johnson	
Access to vaccines	mal	times	<p>This cluster mainly refers to the theme of getting a vaccination appointment and getting access to the vaccine in general. Users report when they have their appointments scheduled and how long they had to wait in order to get their appointments. The prioritisation of people in different groups appears as a sub-theme which is closely related to how long people had to wait in order to schedule their appointment.</p> <p>Again, a few tweets discuss other themes such as the vaccination of children or users' general opinion on getting vaccinated. Since the words of this cluster also contain very frequently used words such as 'man' or '(to) take', we assume that these tweets ended up in the sample</p>
	stehen	to stand	
	nächst	next	
	monat	month	
	nehme	to take	
	warten	to wait	
	woche	week	
	ne	either 'no' or 'a'	

	mann	man	because they matched one of these general words.
	termin	appointment	
	stunde	Hour	
	prio	Prio	
	trotzen	to defy	
Poland			
Cluster name	words	English translation	Findings from qualitative analysis
Information on vaccines	szczepionka	vaccine	Mostly general discussion on vaccines and their effectiveness and tweets commenting on the organization of the vaccination program in Poland, particularly the government's approach (e.g. bribing people to get vaccinated instead of providing them with information). Cluster also includes tweets of people discussing or looking for information on immediate side-effects after being vaccinated.
	wirus	virus	
	wiedzieć	to know sth	
	twierdzić	to claim	
	uboczny	side	
	typ	type	
	wiadomo	it is known	
	uwaga	caution/attention	
	trwać	to last	
	xd*	xd	
	teza	thesis	
	wziąć	to take	
	warianta	variant	
	temat	topic	
	znany	known	
	tą	this	
	zdanie	opinion	
	wiedza	knowledge	
	*a popular emoticon. Qualitative reading of tweets suggest that in the covid vaccine debate it is mostly used in order to express joy (e.g. after receiving information on the vaccination date) or to point out the negative opinion on some of the Polish government's policies adopted in the vaccination program. Netnography also discovered that these two letters were used in this order as two first letters of a code assigned to a series of pfizer vaccines, thus becoming a playful reference to getting vaccinated		
Covid-19 tests	test	test	Mostly neutral tweets,again a lot on the topic however anti-vaccine discourse is also visible in this cluster, and all anti-vaxx tweets in the sample referred to narratives of fake news and conspiracy theories, particularly on the virus and vaccines as means of depopulation. Another narrative visible in this cluster is the
	wynik	result	

			<p>issue of freedom in relation to the need to show test or coronapass in order to participate in social life.</p> <p>This cluster helped in identifying a part of the discourse not found in netnography - sharing information on which summer holiday destinations no coronapass or test result is needed.</p>
Health risks	ważny	important	<p>Similarly as in cluster 0, a lot of tweets were on the general topic of vaccines and discussing the government's vaccination program.</p> <p>The anti-vaccine narrative on big pharma making money from pandemics and influencing government's policy and vaccines as a medical experiment appears in this cluster.</p>
	żyto*	rye*	
	szczepić	to vaccinate	
	źle	bad (adv)	
	wierzyć	to believe	
	zrobić	to do/make	
	wczoraj	yesterday	
	zaszczepić	to vaccinate	
	świat	world	
	wystarczyć	to last/to be enough	
	zacząć	to begin	
	zdrowie	health	
	życie	life	
	trochę	a bit	
	zły	bad (adj)	
	większość	majority	
	własny	own	
	widzieć	to see	
	uważać	to claim/to be careful	
	wybór	choice	
			*Most likely it is a wrong output of the lemmatization of the verb "żyć" (to live) or "użyć" (to use).
Death and disease	umierać	to die	<p>Tweets in this cluster helped in identifying a narrative on deaths and adverse health effects caused by vaccine, noting the cases of private and public persons who died shortly after getting vaccinated.</p>
	wieko	lid	
	zakażenie	infection	
	zembrzeć	to die	<p>The sample of tweets from this cluster included a lot of anti-vaccine tweets, usually placed within the narrative of vaccines still</p>
	śmierć	death	

	znać	to know sth/sb	being in the testing phase or citing the fake news.
	wysoki	high	
	szpital	hospital,	
	zaszczepionych	vaccinated	
	żyć	to live	
	umrzeć	to die	
	zaszczepieni	vaccinated	
	zgon	decease	
	wielki	huge	
	tysiąc	thousand	
	zaszczepiony	vaccinated	
	usa	USA	
	zachorować	to get sick	
Vaccination program	termin	date	<p>Tweets in this cluster are mostly discussing and criticizing shortcomings of the government's vaccination program, referring to personal problems with registering for vaccination/canceled appointments/ traveling long distances to get vaccinated.</p> <p>Pro-vaccination tweets seem to appear in this cluster more often than in others.</p>
	tydzień	week	