

# More childhood cancer diagnoses than expected: *Incidence, time of diagnosis and delivery of healthcare among children with cancer in Germany during the COVID-19 pandemic*

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# Following the outbreak of the COVID-19 pandemic...

- In many countries, healthcare authorities advised to **delay care for non-acute or not life-threatening conditions**
- **Healthcare services** (for non-communicable diseases) have been **severely disrupted** in the beginning of the COVID-19 pandemic.
- **Remarkable decline in new cancer diagnoses** as well as evidence for **missed and delayed diagnoses, delayed treatment and rises in cancer deaths** have been noted - **also specifically for childhood cancers.**
- **Timely diagnosis is essential** for good prognosis and preventing advanced disease, which commonly requires more intensive therapy.



# Causes of childhood cancers remain largely unknown

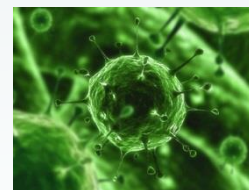
- Weak or no effect of parental behaviour and diet



- No established environmental causes, but...



- Possible role of infections/ immune system in childhood leukaemia

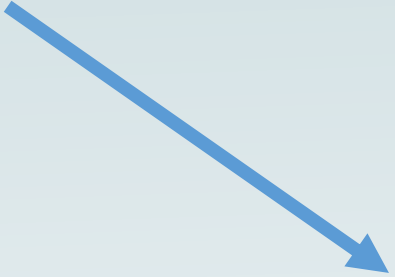




- increasing concern about the indirect impact on cancer care and timely diagnosis
- scientific interest of the impact of the pandemic with its social distancing measures on the risk of children of developing B-precursor ALL



**Closure of nurseries, kindergartens, and schools**



**Lack of immune system stimulation during infancy**

**Removed older susceptible children from exposure to common infectious agents**



**+ Risk**

**- Risk**

# Design

## Quantitative assessment

- to **quantify numbers of newly diagnosed cases of childhood cancer** reported to the German Childhood Cancer Registry and estimate **incidence rates** of childhood cancers

## Qualitative survey

- to explore the perceptions of paediatric oncologists of (i) the **diagnostic process and timeliness** of diagnosis, (ii) the **delivery of healthcare** including the provision of psychosocial supportive care and **overall changes in structures and processes of healthcare provision** in response to the COVID-19 pandemic

# Methods

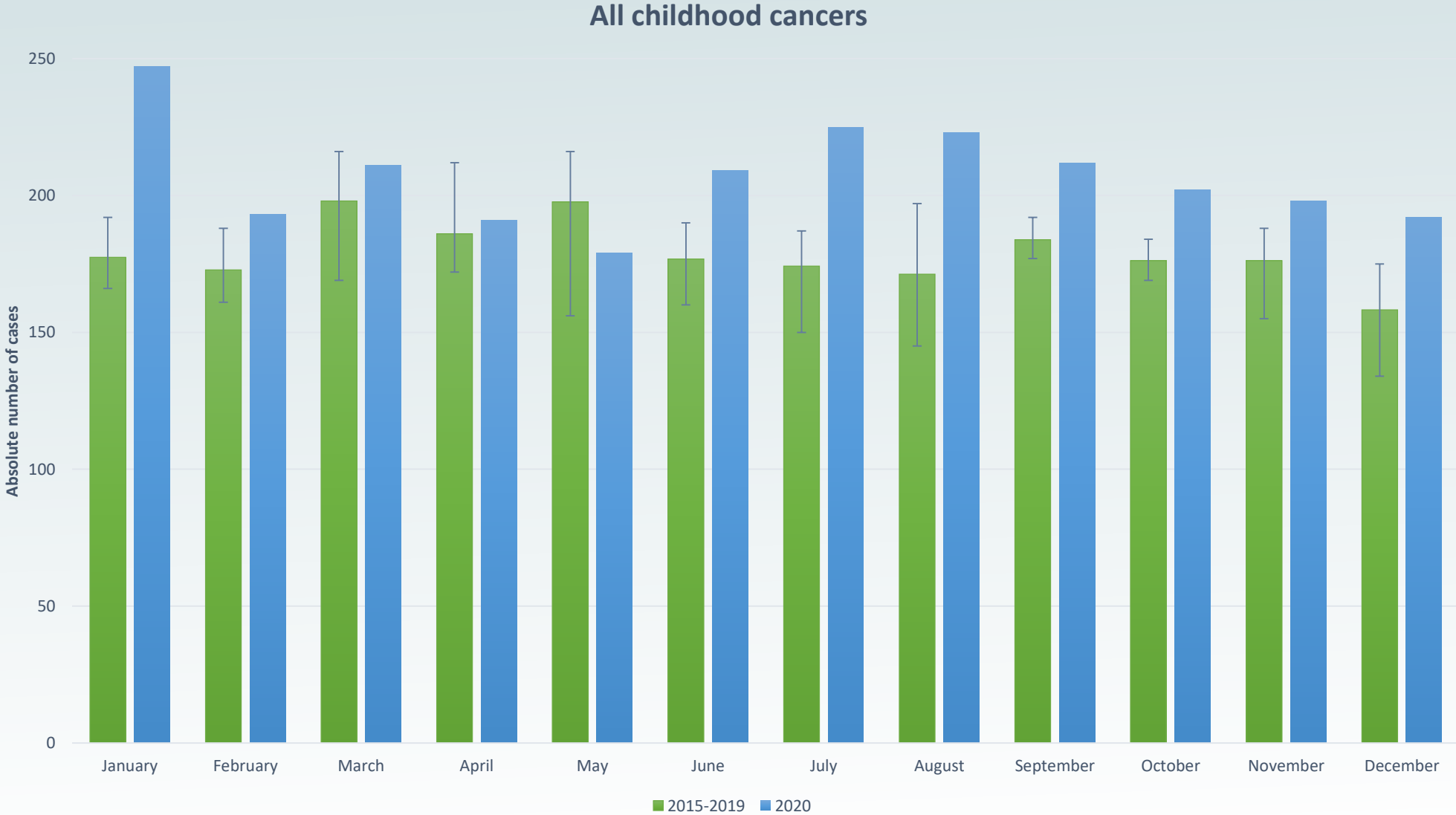
## **Quantitative assessment:**

- Analysis **of newly diagnosed cases of childhood cancer in Germany** at ages 0-14 and 0-17 in 2020 and 2021
- Absolute numbers for each month of 2020 compared to the previous five years (2015-2019)
- Age-standardised incidence rates in 2020 and 2021 compared to the previous five years (2015-2019)

## **Qualitative survey:**

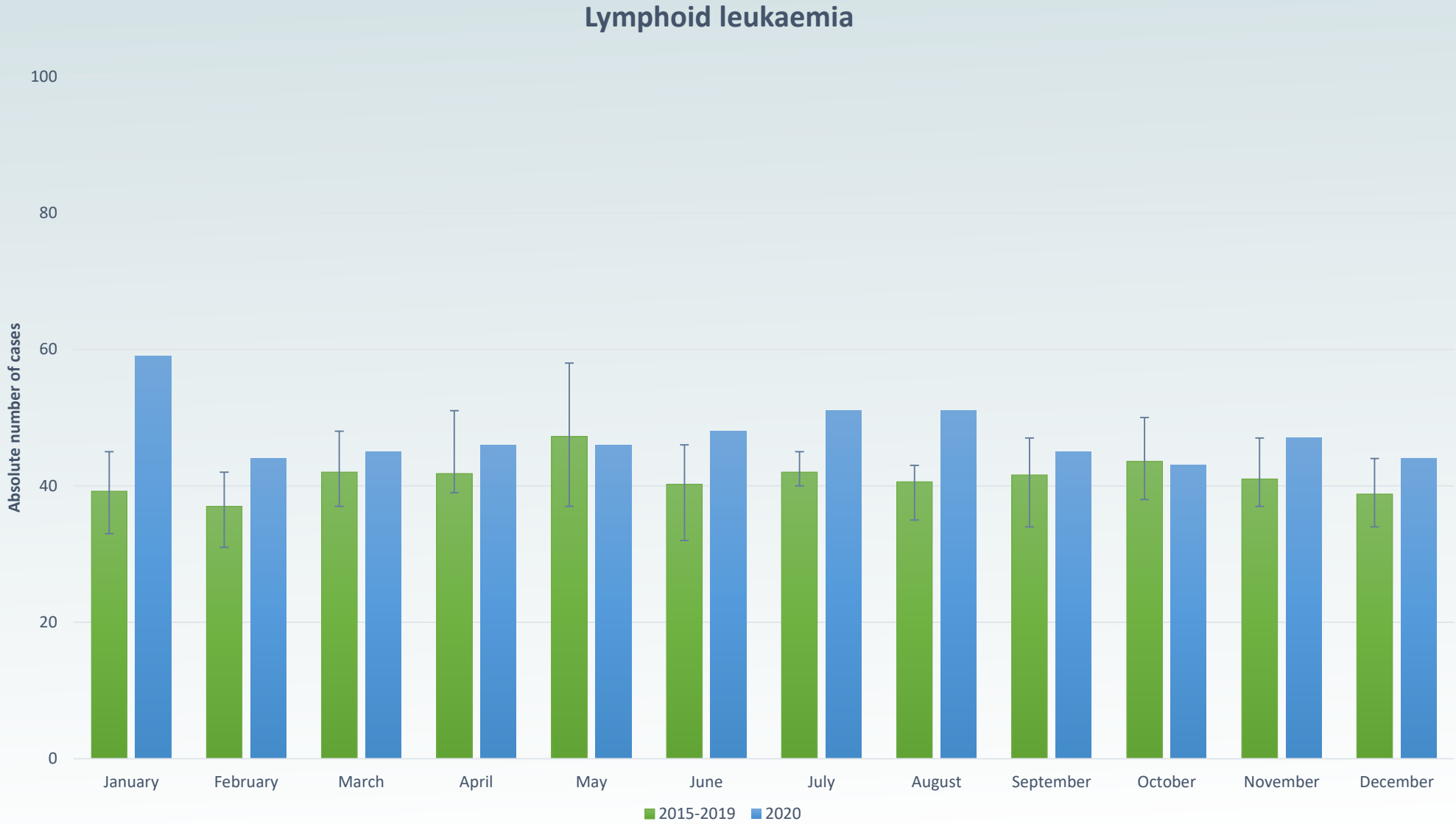
- Survey with open-ended questions: Invitation to 16 paediatric haematology-oncology units (response: 75%)
- Qualitative content analysis to analyse the responses to the open-ended questions

# Absolute numbers of newly diagnosed childhood cancer cases in 2020 vs. the average numbers of childhood cancer cases during 2015-2019







# Absolute numbers of newly diagnosed lymphoid leukaemia cases in 2020 vs. the average numbers of childhood cancer cases during 2015-2019



# Estimated age-standardised incidence rates of childhood cancer in Germany in 2020

	0-14 years			0-17 years		
	ASR per 1,000,000 [95% CI]			ASR per 1,000,000 [95% CI]		
	2015-2019	2020	% 	2015-2019	2020	% 
<b>All cancers</b>	172.8 [169.3-176.4]	190.5 [182.4-198.7]	10.2%	171.3 [168.1-174.5]	191.0 [183.6-198.5]	11.5%
<b>Leukaemias</b>	55.2 [53.2-57.2]	61.2 [56.7-65.9]	10.9%	51.5 [49.8-53.3]	56.9 [52.9-61.1]	10.3%
<b>Lymphoid leukaemia</b>	43.1 [41.3-44.9]	47.6 [43.6-51.7]	10.4%	39.2 [37.7-40.7]	43.2 [39.7-46.8]	10.2%
<b>Lymphomas</b>	21.2 [20.0-22.4]	23.7 [21.0-26.6]	11.8%	26.1 [24.9-27.3]	30.0 [27.2-32.9]	14.9%
<b>CNS tumours</b>	41.2 [39.6-43.0]	46.2 [42.3-50.3]	12.1%	39.3 [37.8-40.8]	44.5 [41.0-48.2]	13.5%
<b>Non-CNS solid tumours</b>	55.2 [53.2-57.2]	59.3 [54.8-64.0]	7.6%	54.3 [52.5-56.1]	59.5 [55.4-63.8]	9.8%

# Qualitative content analysis – key findings

## **Diagnostic process/ timeliness of diagnosis**

- Diagnostic processes, timeliness of diagnosis, delivery of treatment hardly affected

## **Delivery of healthcare for children with cancer**

- Psychosocial supportive care and non-urgent appointments such as long-term follow-up care of survivors markedly reduced during the lockdown periods

**Overall: Disruptions seemed to differ** between the first and the second lockdown, and the inter-lockdown period.

# Estimated age-standardised incidence rates of childhood cancer in Germany in 2021

ICCC-3 diagnostic group	0-14 years			0-17 years		
	ASR per 1,000,000 [95% CI]			ASR per 1,000,000 [95% CI]		
	2015-2019	2020	2021	2015-2019	2020	2021
All cancers	172.8 [169.3-176.4]	190.5 [182.4-198.7]	174.0 [166.3-181.8]	171.3 [168.1-174.5]	191.0 [183.6-198.5]	175.9 [168.9-183.1]
Leukaemias	55.2 [53.2-57.2]	61.2 [56.7-65.9]	58.9 [54.4-63.5]	51.5 [49.8-53.3]	56.9 [52.9-61.1]	56.0 [52.1-60.2]
<i>Lymphoid leukaemia</i>	43.1 [41.3-44.9]	47.6 [43.6-51.7]	44.8 [40.9-48.8]	39.2 [37.7-40.7]	43.2 [39.7-46.8]	40.8 [37.4-44.4]
<i>Acute myeloid leukaemia</i>	7.3 [6.6-8.1]	7.8 [6.2-9.6]	8.3 [6.7-10.1]	7.3 [6.6-7.9]	7.7 [6.2-9.3]	8.7 [7.2-10.3]
Lymphomas	21.2 [20.0-22.4]	23.7 [21.0-26.6]	18.5 [16.1-21.0]	26.1 [24.9-27.3]	30.0 [27.2-32.9]	24.9 [22.4-27.5]
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Non-CNS solid tumours	55.2 [53.2-57.2]	59.3 [54.8-64.0]	52.8 [48.6-57.2]	54.3 [52.5-56.1]	59.5 [55.4-63.8]	52.7 [48.8-56.7]

# Estimated age-standardised incidence rates of B-cell precursor ALL

B-cell precursor acute lymphoblastic leukaemia age-specific incidence rate per 1,000,000 [95% CI]					
	2005-2009	2010-2014	2015-2019	2020	2021
2-6 years of age	72.7 [68.8-76.7]	70.2 [66.3-74.2]	72.2 [68.3-76.2]	79.1 [70.6-88.4] <b>9.6%</b>	68.1 [60.3-76.7]
7-14 years of age	23.8 [22.2-25.6]	22.5 [20.8-24.3]	22.8 [21.1-24.6]	24.4 [20.6-28.8] <b>7.0%</b>	23.4 [19.7-27.6]

# Discussion



- **No decrease in newly diagnosed childhood cancer cases** in Germany during the COVID-19 pandemic that would suggest missed or (considerably) delayed diagnoses
- **Diagnostic processes, timeliness of diagnosis, delivery of treatment hardly affected**
- **Psychosocial supportive care and non-urgent appointments markedly reduced** during the lockdown periods
- (Unexpected) **marked increase in incidence rates in 2020**, across all diagnostic groups, followed by a regression for most cancer types

# Discussion

- Underlying reasons of the increase in incidence in 2020 are speculative, may **involve greater parental attention** and physician's awareness to early disease symptoms and hence **more timely healthcare consultations and earlier diagnoses**.
- The indications of a **potential rebound effect** in the 2021 for **lymphoma and non-CNS solid tumours** but not for other diagnostic groups, **speaks however against this as the only explanation**.
- Continued **increase** in the **incidence of CNS tumours**: *improvements in completeness of reporting?*





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Additional slides

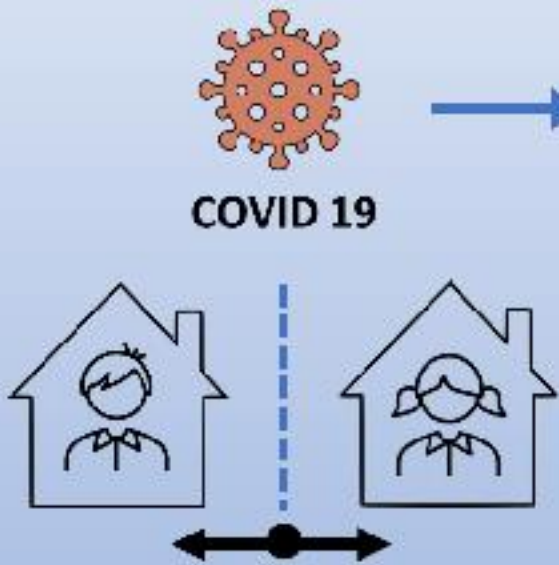
# Decline in new cancer diagnoses for childhood cancer

## Inconsistent observations for paediatric cancer

- Stable number of children diagnosed with cancer (Greece)
- Substantially fewer diagnoses than expected (USA, Italy)
- Decrease in some diagnostic groups or cancer types but not in others (USA, Norway)
- Only a snapshot, limited by small sample sizes of mostly institutional or regional data and capturing only the period of the first pandemic wave



1,551 new ALL cases projected in 2-6-year-old children  
in Germany during the 2020-2024 period



**1 out of 15**  
ALL cases  
attributed to COVID-19



**6.4 %**  
of the total ALL cases might be attributable  
to the lockdown of childcare facilities

# The German Childhood Cancer Registry



- Established 1980 at the Institute of Medical Biostatistics, Epidemiology and Informatics, University Medical Center Mainz
- Nationwide population-based cancer registry
- Collecting data on incident diagnoses of cancers in children and adolescents (aged 0-17 years) with place of residence in Germany
- Defined according to ICCC-3, including non-malignant CNS tumours
- ~2250 incident cases every year