

## Prevalence and Evolution of Dental Restorations: results of the 6th German Oral Health Study (DMS • 6). Online Appendix

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### ABSTRACT

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**Introduction:** Epidemiological evidence on oral health in Germany was updated in 2025 through the 6th German Oral Health Study (DMS • 6). However, epidemiological data describing incidences and progression of dental restorations over time under real-world conditions are lacking at population level. This analysis of DMS • 6 data therefore aimed to assess the clinical development of caries-related dental restorations and the materials used, and to quantify their rates of change, including the development of secondary caries, after a 9-year follow-up.

**Method:** First, a cross-sectional analysis of caries-related dental restorations was conducted. A total of 958 younger adolescents (12-year-olds), 927 younger adults (35- to 44-year-olds), and 797 younger seniors (65- to 74-year-olds) underwent standardized clinical examinations. Direct and indirect restorations were distinguished, as were tooth-colored, metallic, and cement-based restorative materials. Secondary (dentin) caries at the restoration margins were also assessed. Second, in the longitudinal analysis, 371 individuals from the adolescent cohort (12-year olds at baseline; 20-year-olds at follow-up), 342 individuals from the adult cohort (35- to 44-year-olds at baseline; 43- to 52- year-olds at follow-up), and 350 individuals from the senior cohort (65- to 74-year-olds at baseline; 73- to 82-year-olds at follow-up) were re-examined after 9.1 ( $\pm 0.3$ ) years for progression and incidence analyses.

**Results:** Younger adolescents predominantly presented with tooth-colored restorations, whereas amalgam fillings and indirect restorations were virtually absent. In adulthood, the prevalence of amalgam restorations increased continuously across life course, reaching 42%. The prevalence of indirect restorations also increased with age. The proportion of secondary caries increased to 10.5% in senior age, with tooth-colored restorations being more frequently affected than amalgam restorations. During the 9-year observation period, the prevalence of dental restorations among adolescents increased from 13.2% to 47.7%. The progression rates of dental restorations (per 100 person-years) were 16.4 in adults and 15.8 in seniors.

**Conclusion:** The prevalence of dental restorations increased significantly throughout the life course. Indirect restorations are used more frequently in older age groups. The development of secondary caries also appears to be age-dependent; under real-world conditions, tooth-colored restorations were not inferior to amalgam restorations.

**KEYWORDS:** Caries, Cross-sectional studies, Cohort studies, Dentists, Dental health surveys, Dental care, Dental restoration, DMS 6, Epidemiology, Germany, Incidence, Oral health, Prevalence

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## Appendix 1

**Table A1: Distribution of restorative materials in direct and indirect restorations by tooth position**

Direct restorations (fillings)				
	No. of restorations	Amalgam	Tooth-colored	Cement
<b>Molars</b>	5,318	30.7%	67.7%	1.6%
<b>Premolars</b>	2,831	24.4%	74.6%	1.0%
<b>Incisors and canines</b>	1,932	1.5%	98.3%	0.1%
Indirect restorations				
	No. of restorations	Dental casting alloy	Tooth-colored	
<b>Molars</b>	1,818	37.1%	62.8%	
<b>Premolars</b>	1,229	15.7%	84.3%	
<b>Incisors and canines</b>	915	4.4%	95.6%	

Data are presented as numbers (n) and percentages based on unweighted data.

## Appendix 2

**Table A2.1: Distribution of tooth surfaces restored with direct restorations by tooth position in younger adolescents (12-year-olds), younger adults (35- to 44-year-olds), and younger seniors (65- to 74-year-olds)**

	No. of direct restorations (fillings)	Number of filled tooth surfaces per direct restoration			
		1	2	3	+3
<b>12-year-olds</b>					
First molars	350	52.6%	40.6%	3.4%	3.4%
Second molars	33	87.9%	12.1%	0.0%	0.0%
Premolars	68	25.0%	61.8%	13.2%	0.0%
Central incisors	40	12.5%	30.0%	37.5%	20.0%
Lateral incisors	10	40.0%	20.0%	0.0%	40.0%
Canines	NA	NA	NA	NA	NA
<b>35- to 44-year-olds</b>					
First molars	3,728	19.7%	38.4%	29.5%	12.4%
Second molars	2,866	34.4%	41.2%	16.2%	8.1%
Premolars	3,024	10.5%	53.8%	29.3%	6.4%
Central incisors	503	6.6%	29.8%	38.2%	25.4%
Lateral incisors	437	17.4%	30.7%	25.4%	26.5%
Canines	283	20.8%	40.3%	27.6%	11.3%
<b>65- to 74-year-olds</b>					
First molars	1,376	9.1%	27.9%	36.6%	26.4%
Second molars	1,504	20.4%	36.0%	26.1%	17.4%
Premolars	2,837	13.6%	38.2%	35.8%	12.5%
Central incisors	1,056	9.5%	16.0%	42.2%	32.3%
Lateral incisors	980	16.1%	22.3%	34.7%	26.9%
Canines	902	28.5%	29.2%	27.4%	14.9%

Data are presented as numbers (n) and percentages based on unweighted data.

NA, not applicable

**Table A2.2: Distribution of tooth surfaces restored with inlays and partial crowns by tooth position in younger adults (35- to 44-year-olds), and younger seniors (65- to 74-year-olds)**

	No. of indirect restorations	Inlays			Partial crowns
		1	2	3	+3
<b>35- to 44-year-olds</b>					
<b>First molars</b>	390	0.5%	10.8%	33.8%	54.9%
<b>Second molars</b>	191	1.0%	25.1%	18.8%	55.0%
<b>Premolars</b>	146	0.7%	12.3%	34.9%	52.1%
<b>Central incisors</b>	24	0.0%	0.0%	50.0%	50.0%
<b>Lateral incisors</b>	14	0.0%	0.0%	42.9%	57.1%
<b>Canines</b>	16	0.0%	0.0%	0.0%	100.0%
<b>65- to 74-year-olds</b>					
<b>First molars</b>	761	0.3%	5.3%	22.1%	72.4%
<b>Second molars</b>	493	2.6%	11.4%	27.4%	58.6%
<b>Premolars</b>	556	0.7%	25.5%	48.0%	25.7%
<b>Central incisors</b>	62	1.6%	0.0%	33.9%	64.5%
<b>Lateral incisors</b>	50	4.0%	0.0%	24.0%	72.0%
<b>Canines</b>	20	10.0%	0.0%	30.0%	60.0%

Data are presented as numbers (n) and percentages based on unweighted data.

**Table A2.3: Distribution of tooth surfaces restored with indirect restorations by tooth position in younger adults (35- to 44-year-olds), and younger seniors (65- to 74-year-olds)**

	No. of indirect restorations	Inlays			Partial crowns	Full crowns
		1	2	3	+3	
<b>35- to 44-year-olds</b>						
First molars	1,472	0.1%	2.9%	9.0%	7.1%	81.0%
Second molars	844	0.2%	5.7%	4.3%	4.7%	85.1%
Premolars	1,149	0.1%	1.6%	4.4%	3.1%	90.8%
Central incisors	192	0.0%	0.0%	6.3%	6.3%	87.5%
Lateral incisors	154	0.0%	0.0%	3.9%	5.2%	90.9%
Canines	100	0.0%	0.0%	0.0%	16.0%	84.0%
<b>65- to 74-year-olds</b>						
First molars	3,092	0.1%	1.3%	5.4%	7.6%	85.6%
Second molars	2,226	0.6%	2.5%	6.1%	4.7%	86.2%
Premolars	4,360	0.1%	3.3%	6.1%	1.6%	89.0%
Central incisors	1,034	0.1%	0.0%	2.0%	3.9%	94.0%
Lateral incisors	1,010	0.2%	0.0%	1.2%	3.6%	95.0%
Canines	760	0.3%	0.0%	0.8%	1.6%	97.4%

Data are presented as numbers (n) and percentages based on unweighted data.

**Appendix 3**

**Table A3: Proportion of secondary caries on filled teeth by restorative material and number of filled surfaces in younger adolescents (12-year-olds), younger adults (35- to 44-year-olds), and younger seniors (65- to 74-year-olds)**

		12-year-olds		35- to 44-year-olds		65- to 74-year-olds	
		Restorative material		Restorative material		Restorative material	
		Amalgam	Tooth-colored	Amalgam	Tooth-colored	Amalgam	Tooth-colored
<b>No of filled teeth</b>		3	346	1,197	5,255	1,157	5,062
<b>Secondary caries number of filled surfaces (% , thooth)</b>	<b>1 filled surface</b>	0.0 (NA)	1.7 (0.6; 4.1)	1.0 (0.4; 2.1)	0.8 (0.5; 1.4)	1.4 (0.5; 3.0)	0.9 (0.5; 1.7)
	<b>2 filled surfaces</b>	0.0 (NA)	3.0 (0.9; 7.9)	1.5 (0.7; 2.9)	2.0 (1.4; 2.7)	2.9 (1.6; 4.8)	2.0 (1.3; 3.1)
	<b>3 filled surfaces</b>	0.0 (NA)	8.3 (0.9; 32.8)	1.2 (0.3; 3.8)	3.1 (2.1; 4.4)	4.1 (2.2; 6.9)	1.8 (1.1; 3.0)
	<b>≥4 filled surfaces</b>	0.0 (NA)	0.0 (NA)	0.0 (NA)	2.2 (1.4; 3.4)	5.6 (1.9; 12.7)	1.5 (1.1; 2.0)

Data are presented as numbers (n) and percentages based on unweighted data.

NA, not applicable

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