Dental Decay Phenotype in Nonsyndromic Orofacial Clefting

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Appendix

Methods

Sample

Exclusion criteria for controls included a positive family history for orofacial clefts or syndromes and a history of facial trauma or surgery. Exclusion criteria for unaffected family members was overt orofacial clefting. Also, all edentulous subjects were excluded from the study. In the unaffected sibling and control groups only one blood related person per family was included in each dentition group, excluding spouses, thus attempting to remove genetic bias from the dentition group comparisons.

Dental Exam and intraoral photos

In-person dental exams for the whole mouth were performed on subjects by oral cavity inspection utilizing dental mirrors and explorers. Sites were provided with cameras (Cannon EF 100mm f/2.8 macro USM lens, Cannon macro MR-14EX ring flash) and supplies for intraoral photo collection. Prior to photographs, all removable appliances/prostheses were removed.

Calibration

Calibration and training for intraoral dental exams and photos was performed at the University of Pittsburgh for all sites prior to the start of data collection. The photo rater, BJH, was calibrated against two experienced dentists and co-authors, LMU and ARV. Data from fifteen subjects randomly chosen were used for calibration. Each subject was rated two times by each rater (BJH, LMU, and ARV). Intrarater reliability for BJH, kappa = 0.95. Inter-rater reliability between all 3 raters kappa = 0.91-0.93. Testing was completed to determine the reliability between the in-person dental exam form and the intraoral photo form on 158 subjects who had both forms, tests showing both forms with almost perfect agreement (kappa >90%).

Statistical Methods

For each dentition, various case-control comparison models were run adjusting for gender and age as a continuous or categorical variable. Within the primary and mixed dentition groups, all individuals spanned approximately a five year age interval. Preliminary regression analysis showed that there were no age or gender effects on the DFT(dft) or DT(dt) percentages in the primary or mixed dentition groups, except for dft in the primary dentition of the case vs. control proband comparison. As indicated above, different age and gender adjustment models were attempted and no significant case-control differences were obtained regardless of the adjustments performed. Therefore analyses were completed via non-parametric t-tests (Wilcoxon Rank Sum test) with no adjustment for dental age and gender for the primary and mixed dentition. For the permanent dentition, age was found to have significant confounding effects. Therefore the dental age continuum was categorized into nine distinct age groups (Appendix table 1). Regression analyses (general linear modeling) of case-control status, allowing for adjustment of age and gender, were completed by considering the DFT and dft percentages in each area of the mouth.

Discussion

Decay Detection

The use of filled teeth (FT/ft) is a study limitation. Although restorations can be done for various reasons on teeth that don't have dental decay (cracks, chips, trauma, etc) for this study it was assumed that all restorations were completed due to decay which indeed could have overestimated dental decay since patients were examined once by a dental professional who had no other dental records for reference. However %DFT/dft overestimation would apply to both cases and controls and therefore is unlikely to have biased our results. We did not see overestimation in our %DFT/dft compared to other studies likely because the same assumption is broadly made across dental decay studies. In regards to including missing teeth in the %DFT/dft, as mentioned in the methods, they were not included in the current analyses due to limited and in many cases potentially erroneous self-reported data on the reason for missing teeth. Self-reporting was generalized to an area of the mouth (by quadrant) and with multiple potential missing teeth in a given quadrant, we could not assume that all these teeth are missing

due to decay only. This does pose a limitation with the current study. In the analysis, dental decay measurement was also limited to the first molar to first molar in the maxillary and mandibular arches due to the inability to predictably see the second molars in intraoral photographs. The in-person dental exam data was then also limited to first molar to be consistent with the intraoral photographic data. This limitation may have led to a possible decrease in the number of decayed and filled teeth included in the DFT count. However, decay rates in controls between our study and prior studies were similar, lending support to our decay detection methods.

Even though the percent dft and DFT in the current study were lower than most previous studies it is of interest that our results for overall differences in dft and DFT occurrence between case probands and controls are similar with most previous studies for the primary (Chapple and Nunn 2001; Britton and Welbury 2010; Kirchberg et al. 2012; King et al. 2013; Moura et al. 2013) and permanent (Chapple and Nunn 2001; Hewson et al. 2001; Ahluwalia et al. 2004; Kirchberg et al. 2004; Lages et al. 2004; Parapanisiou et al. 2009; Zhu et al. 2010) dentitions, supporting the generalizability of our decay estimation methods (Appendix Tables 3-5). Moreover, we found no significant difference in dental decay between unaffected siblings in the primary, mixed, and permanent dentitions and unaffected parents in the permanent dentition compared with controls. Unlike case probands whose decay may be highly related to surgical complications and/or the physical cleft itself as indicated above, differences between unaffected relatives and controls may be suggestive of a higher genetic predisposition to dental decay. However our results did not support an increased genetic predisposition for decay risk in unaffected relatives beyond that of the general population.

Cleft Type

One possible limitation is that the proportion of cases with CPO in the sample is nearly half of the expected 30%. This is partly because the sites in Colombia and Texas only recruited cases with CLO and CLP as they had recruitment protocols underway before they joined the larger study that only included these phenotypes. This especially reduced the proportion of CPO in the Latin American group. CPO is also generally less prevalent among Hispanics than non-Hispanic Whites (Burg et al. 2016). Since there were no prominent differences in outcome comparisons by cleft type in the overall sample, it is unlikely that the underrepresentation of cases with CPO

would have substantially biased the results pooling by cleft type including when stratifying by ancestry. Further research with larger sample sizes are needed to adequately examine potential heterogeneity in dental phenotypes by cleft type. Notably also, no significant differences in dental decay were found between the cleft area (canine to canine) and the rest of the maxillary dentition.

Age and SES

It is also generally known that age is a confounding factor for increased dental decay risk. We found that age was a confounder for the case-control comparisons of permanent dentition both in the pooled sample and in the two groups defined by self-reported ethnicity. We account for this confounding by adjusting for age in the regression models for these comparisons. However, case-control differences in permanent dentition decay may become more prominent with age (i.e. effect heterogeneity) due to differences in type and intensity of decay risk factors over time. Identifying such heterogeneity requires large samples with longitudinal data that allow comparisons at different ages between cases and controls matched by age. Examining such heterogeneity in future studies with sufficient samples by age is an important research area.

Another possible limitation of the study is that case probands and controls may differ based on socioeconomic status (SES) and access to dental care. However, control subjects were recruited from the same communities as case probands with no restrictions on SES or access to dental care thus reducing, but not eliminating, the chance of these confounders.

Ancestry

Unmeasured differences in race/ethnicity between cases and controls may have been further increased by some sites (Colorado and Texas) recruiting only cases and not controls, which may have further imbalanced race/ethnicity between cases and controls. This may confound our results, although it is unclear *a priori* whether this would bias the results towards the null indicating no differences between cases and controls (which is the main pattern that we find) or in the direction of spurious differences, in which case such differences do not seem to be impacting our results. In addition to possibly introducing confounding in the pooled analysis and the analyses of the two broad subgroups, another limitation of such heterogeneity is that we are

unable to fully examine if and how case-control group differences in these dental outcomes vary by ancestry (i.e. effect heterogeneity) and whether the pattern of no or small and insignificant differences is also observed across narrowly defined racial/ethnic groups. Such an evaluation would require large samples for each ancestral group and matching cases and controls by race/ethnicity. However, when we stratified our sample into the two broad groups mentioned above (Caucasian versus non-Caucasian Latin American), there were no significant differences between cases and controls within each group (see tables 2-4). Therefore, while confounding and effect heterogeneity by ancestral background are still potential limitations, these analyses suggests that they do not substantially impact our main inference.

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Appendix Table 1. Dental Age Categories for the Permanent Dentition.

Age Group in years	N* (PB, SIB, PAR, CTRL)
<15	75, 75, 0, 66
15-19	75, 70, 16, 85
20-24	28, 39, 169, 114
25-29	21, 16, 234, 142
30-34	6, 5, 216, 149
35-39	3, 4, 255, 131
40-49	4, 0, 297, 124
50-59	2, 0, 81, 47
≥60	1, 0, 17, 10

* Within the permanent dentition group

Appendix Table 2. Descriptive Analysis of Case Probands, Unaffected Family Members and Controls.

	Relation Group				
	Cleft Proband	Non-Cleft Sibling of Probands	Non-Cleft Parents of Probands	Controls	Total
ALL	639	464	1085	1138	3326
Gender (M,F)	384,255	219,245	444,641	493,645	1540,1786
Dentition (Prime,Mx,Permanent)	169,255,215	88,167,209	0,0,1085	81,189,868	338,611,2377
Gender X Dentition					
Male prime only	97	53	0	41	191
Female prime only	72	35	0	40	147
Male mixed	157	83	0	105	345
Female mixed	98	84	0	84	266
Male perm only	130	83	444	347	1004
Female perm only	85	126	641	521	345
Caucasian	383	317	636	636	1972
Gender (M,F)	234,149	153,164	259,377	285,351	931,1041
Dentition (Prime,Mx,Permanent)	109,176,98	66,127,124	0,0,636	42,95,499	217,398,1357
Gender X Dentition					
Male prime only	66	40	0	24	130
Female prime only	43	26	0	18	87
Male mixed	110	51	0	54	225
Female mixed	66	66	0	41	173
Male perm only	58	62	259	207	576
Female perm only	40	72	377	292	781
Latin American	256	147	449	502	1354
Gender (M,F)	150,106	66,81	185,264	208,294	609,745
Dentition (Prime,Mx,Permanent)	60,79,117	22,40,85	0,0,449	39,94,369	121,213,1020
Gender X Dentition					
Male prime only	31	13	0	17	61
Female prime only	29	9	0	22	60
Male mixed	47	22	0	51	120
Female mixed	32	18	0	43	93
Male perm only	72	31	185	140	428
Female perm only	45	54	264	229	592

Appendix Table 3: Decayed and Filled Teeth in the Primary Dentition

Primary Only	Area of Mouth	Proband (N = 169)			Sibling (N = 88)			Control (N = 81)		
		dft	dt	ft	dft	dt	ft	dft	dt	ft
ALL	Whole	1.21	0.82	0.39	1.06	0.55	0.52	1.26	1.22	0.04
	Maxilla	0.86	0.62	0.24	0.73	0.47	0.26	0.97	0.94	0.04
	Mandible	0.36	0.21	0.15	0.34	0.08	0.26	0.28	0.28	0
	Maxilla Canine- Canine	0.47	0.39	0.08	0.42	0.34	0.08	0.48	0.46	0.02
Caucasian		Proband (N=109)			Sibling (N=66)			Control (N=42)		
	Whole	1.06	0.65	0.40	0.65	0.26	0.39	0.86	0.83	0.02
	Maxilla	0.68	0.46	0.23	0.39	0.21	0.18	0.60	0.57	0.02
	Mandible	0.37	0.19	0.17	0.26	0.05	0.21	0.26	0.26	0
	Maxilla Canine- Canine	0.33	0.25	0.08	0.20	0.12	0.08	0.33	0.31	0.02
Latin American		Proband (N=60)			Sibling (N=22)			Control (N=39)		
	Whole	1.50	1.13	0.37	2.32	1.41	0.91	1.69	1.64	0.05
	Maxilla	1.17	0.90	0.27	1.73	1.23	0.50	1.38	1.33	0.05
	Mandible	0.33	0.23	0.10	0.59	0.18	0.41	0.31	0.31	0
	Maxilla Canine- Canine	0.72	0.65	0.07	1.09	1.00	0.09	0.64	0.61	0.03

*All numbers given as means

Appendix Table 4: Decayed and Filled Teeth in the Mixed Dentition – Primary and Permanent.

MX Only		Proband (N = 255)			Sibling (N = 167)			Control (N = 189)		
	Area of Mouth	DFT/dft	DT/dt	FT/ft	DFT/dft	DT/dt	FT/ft	DFT/dft	DT/dt	FT/ft
ALL Primary	Whole	1.88	0.93	0.95	1.41	0.53	0.87	1.76	1.28	0.48
	Maxilla	1.25	0.69	0.55	0.75	0.34	0.41	1.15	0.88	0.27
	Mandible	0.64	0.24	0.40	0.66	0.19	0.47	0.60	0.39	0.21
	Maxilla Canine- Canine	0.37	0.26	0.11	0.09	0.06	0.03	0.26	0.25	0.01
ALL Permanent	Whole	0.16	0.07	0.09	0.21	0.07	0.14	0.17	0.05	0.13
	Maxilla	0.12	0.05	0.07	0.11	0.04	0.07	0.14	0.04	0.10
	Mandible	0.04	0.03	0.01	0.10	0.03	0.07	0.04	0.01	0.03
	Maxilla Canine- Canine	0.04	0.02	0.02	0.02	0.01	0.01	0.03	0.01	0.03
		Proband (N =176)			**Sibling (N =127)**			**Control (N = 95)**		
Caucasian Primary	Whole	1.90	0.81	1.09	1.42	0.44	0.98	1.88	1.52	0.36
	Maxilla	1.14	0.53	0.61	0.72	0.27	0.46	1.03	0.87	0.16
	Mandible	0.76	0.28	0.48	0.69	0.17	0.52	0.84	0.64	0.02
	Maxilla Canine- Canine	0.35	0.19	0.15	0.06	0.02	0.04	0.22	0.22	0
Caucasian Permanent	Whole	0.12	0.06	0.06	0.20	0.06	0.14	0.12	0.03	0.09
	Maxilla	0.06	0.04	0.05	0.09	0.02	0.07	0.09	0.03	0.06
	Mandible	0.04	0.02	0.02	0.11	0.04	0.07	0.03	0	0.03
	Maxilla Canine- Canine	0.03	0.02	0.01	0.01	0	0.01	0.01	0	0.01
		Proband (N = 79)			**Sibling (N =40)**			**Control (N = 94)**		
Latin American Primary	Whole	1.84	1.20	0.63	1.38	0.83	0.55	1.6	1.03	0.61
	Maxilla	1.48	1.06	0.42	0.83	0.58	0.24	1.28	0.89	0.38
	Mandible	0.35	0.14	0.22	0.55	0.25	0.30	0.36	0.14	0.22
	Maxilla Canine- Canine	0.43	0.41	0.03	0.18	0.18	0	0.30	0.29	0.01
Latin American Permanent	Whole	0.27	0.11	0.15	0.25	0.13	0.13	0.22	0.06	0.16
	Maxilla	0.20	0.06	0.14	0.18	0.13	0.05	0.18	0.04	0.14
	Mandible	0.06	0.05	0.01	0.08	0	0.08	0.04	0.02	0.02
	Maxilla Canine- Canine	0.04	0	0.04	0.08	0.05	0.03	0.05	0.01	0.04

*All numbers given as means

Appendix Table 5: Decayed and Filled teeth in the Permanent Dentition

Permanent Only	Area of Mouth	Proband (N = 215)			Sibling (N = 209)			Parent (N = 1085)			Control (N = 868)		
		DFT	DT	FT	DFT	DT	FT	DFT	DT	FT	DFT	DT	FT
ALL	Whole	2.00	0.56	1.40	1.53	0.42	1.11	4.01	0.77	3.34	2.81	0.55	2.26
	Maxilla	1.23	0.39	0.84	0.90	0.30	0.60	2.84	0.54	1.30	2.03	0.41	1.62
	Mandible	0.73	0.17	0.56	0.64	0.12	0.52	1.25	0.21	1.04	0.77	0.13	0.64
	Maxilla Canine-Canine	0.35	0.18	0.17	0.21	0.10	0.11	0.99	0.25	0.74	0.69	0.19	0.50
Caucasian		Proband (N=98)			Sibling (N= 124)			Parent (N= 636)			Control (N=499)		
	Whole	2.08	0.45	1.63	1.42	0.49	0.93	4.04	0.60	3.44	**3.23**	**0.53**	**2.70**
	Maxilla	1.19	0.34	0.86	0.81	0.31	0.50	2.67	0.39	2.28	2.20	0.36	1.85
	Mandible	0.89	0.11	0.78	0.61	0.18	0.43	1.37	0.21	1.16	1.03	0.17	0.86
	Maxilla Canine-Canine	0.31	0.16	0.15	0.17	0.07	0.10	0.97	0.19	0.78	0.79	0.17	0.61
Latin American		Proband (N=117)			Sibling (N= 85)			Parent (N= 449)			Control (N=369)		
	Whole	1.86	0.65	1.21	1.71	0.32	1.39	4.15	0.97	3.18	2.24	0.58	1.66
	Maxilla	1.26	0.43	0.83	1.04	0.29	0.74	3.07	0.77	2.30	1.82	0.51	1.31
	Mandible	0.60	0.21	0.39	0.67	0.02	0.65	1.09	0.21	0.88	0.42	0.07	0.35
	Maxilla Canine-Canine	0.38	0.20	0.18	0.26	0.13	0.13	1.02	0.33	0.69	0.56	0.22	0.34

*All numbers given as means

OFC Dental Phenotype Form Part 2 Dental Professionals

20278

Recorded by
Dentist Initials

Study ID Letters - Number

Individual ID Number - Number

Date mm / dd / yyyy

1. Dental Examination, Maxillary Teeth

☐ Part 2 Not Completed/Refused

Rate each tooth by marking the bubbles below. Fill-in the bubble for primary or permanent tooth. Teeth can either be missing, sound, decayed, or restored. If there is a supernumerary tooth, mark the box between the two adjacent teeth.

Quadrant 1		18 1	17 2	16 3	15 ○ 4 55 ○ A	14 ○ 5 54 ○ B	13 ○ 6 53 ○ C	12 ○ 7 52 ○ D	11 ○ 8 51 ○ E
Missing:	Decay	○	○	○	○	○	○	○	○
	Agenesis	○	○	○	○	○	○	○	○
	Other	○	○	○	○	○	○	○	○
	X-ray Needed	○	○	○	○	○	○	○	○
Sound		○	○	○	○	○	○	○	○
Decayed		○	○	○	○	○	○	○	○
Restored		○	○	○	○	○	○	○	○
Other:	Fluorosis	○	○	○	○	○	○	○	○
	Hypoplasia	○	○	○	○	○	○	○	○
	Microdontia	○	○	○	○	○	○	○	○
	Impacted	○	○	○	○	○	○	○	○
	Rotation	○	○	○	○	○	○	○	○
	Displaced	○	○	○	○	○	○	○	○
	Other (specify)	○	○	○	○	○	○	○	○
Extra Teeth		○	○	○	○	○	○	○	○

Quadrant 1 Notes

Quadrant 2		21 ○ 9 61 ○ F	22 ○ 10 62 ○ G	23 ○ 11 63 ○ H	24 ○ 12 64 ○ I	25 ○ 13 65 ○ J	26 14	27 15	28 16
Missing:	Decay	○	○	○	○	○	○	○	○
	Agenesis	○	○	○	○	○	○	○	○
	Other	○	○	○	○	○	○	○	○
	X-ray Needed	○	○	○	○	○	○	○	○
Sound		○	○	○	○	○	○	○	○
Decayed		○	○	○	○	○	○	○	○
Restored		○	○	○	○	○	○	○	○
Other:	Fluorosis	○	○	○	○	○	○	○	○
	Hypoplasia	○	○	○	○	○	○	○	○
	Microdontia	○	○	○	○	○	○	○	○
	Impacted	○	○	○	○	○	○	○	○
	Rotation	○	○	○	○	○	○	○	○
	Displaced	○	○	○	○	○	○	○	○
	Other (specify)	○	○	○	○	○	○	○	○
Extra Teeth		○	○	○	○	○	○	○	

Quadrant 2 Notes

Appendix Figure I. In-person dental exam form

OFC Dental Phenotype Part 2 Intra-Oral Photos

4106

Recorded by
Initials

Study ID — Letters | Numbers

Date — mm / dd / yyyy

Individual ID — Number - Number

Overall Photo Quality

- O Poor
- O Good

1. Dental Examination, Maxillary Teeth

Rate each tooth by marking the bubbles below. Each tooth should have an entry. Fill-in the bubble for primary or permanent tooth. Teeth can either be missing or present. If there is space or a supernumerary tooth, mark the box between the two adjacent teeth.

Quadrant 1	18 1	17 2	16 3	15 O 4 55 O A	14 O 5 54 O B	13 O 6 53 O C	12 O 7 52 O D	11 O 8 51 O E
Missing: Agenesis	O	O	O	O	O	O	O	O
Other	O	O	O	O	O	O	O	O
Present	O	O	O	O	O	O	O	O
Present Status:								
Full coverage (crown)	O	O	O	O	O	O	O	O
Partial coverage (onlay, cusp replacement, veneers)	O	O	O	O	O	O	O	O
Filling (amalgam, composite)	O	O	O	O	O	O	O	O
Gross decay	O	O	O	O	O	O	O	O
Attrition more than 2/3 of the clinical crown	O	O	O	O	O	O	O	O
If present:								
Fluorosis	O	O	O	O	O	O	O	O
Hypoplasia	O	O	O	O	O	O	O	O
Hypocalcification	O	O	O	O	O	O	O	O
Microdontia	O	O	O	O	O	O	O	O
Impacted	O	O	O	O	O	O	O	O
Rotation	O	O	O	O	O	O	O	O
Displaced	O	O	O	O	O	O	O	O
Mammalons	O	O	O	O	O	O	O	O
Incisal Fissures	O	O	O	O	O	O	O	O
Other (specify below)	O	O	O	O	O	O	O	O
Confidence: Low	O	O	O	O	O	O	O	O
High	O	O	O	O	O	O	O	O

Extra Teeth	O	O	O	O	O	O	O	O
Space Between Teeth	O	O	O	O	O	O	O	O

Quadrant 1 Notes

Appendix Figure 2. Intraoral potograph evaluation form

Appendix Figure 3. Intra-oral photographs – Primary Dentition

Appendix Figure 4. Intra-oral photograph evaluation form – Primary Dentition

1. Dental Examination, Maxillary Teeth

Rate each tooth by marking the bubbles below. Each tooth should have an entry. Fill-in the bubble for primary or permanent tooth. Teeth can either be missing or present. If there is space or a supernumerary tooth, mark the box between the two adjacent teeth.

Quadrant 1	18 1	17 2	16 3	15 ○ 4 55 ● A	14 ○ 5 54 ● B	13 ○ 6 53 ● C	12 ○ 7 52 ● D	11 ○ 8 51 ● E
Missing: Agenesis	○	○	○	○	○	○	○	○
Other	●	●	●	○	○	○	○	○
Present	○	○	○	●	●	●	●	●
Present Status:								
Full coverage (crown)	○	○	○	○	○	○	○	○
Partial coverage (onlay, cusp replacement, veneers)	○	○	○	○	○	○	○	○
Filling (amalgam, composite)	○	○	○	○	○	○	○	○
Gross decay	○	○	○	○	○	○	●	●
Attrition more than 2/3 of the clinical crown	○	○	○	○	○	○	○	○

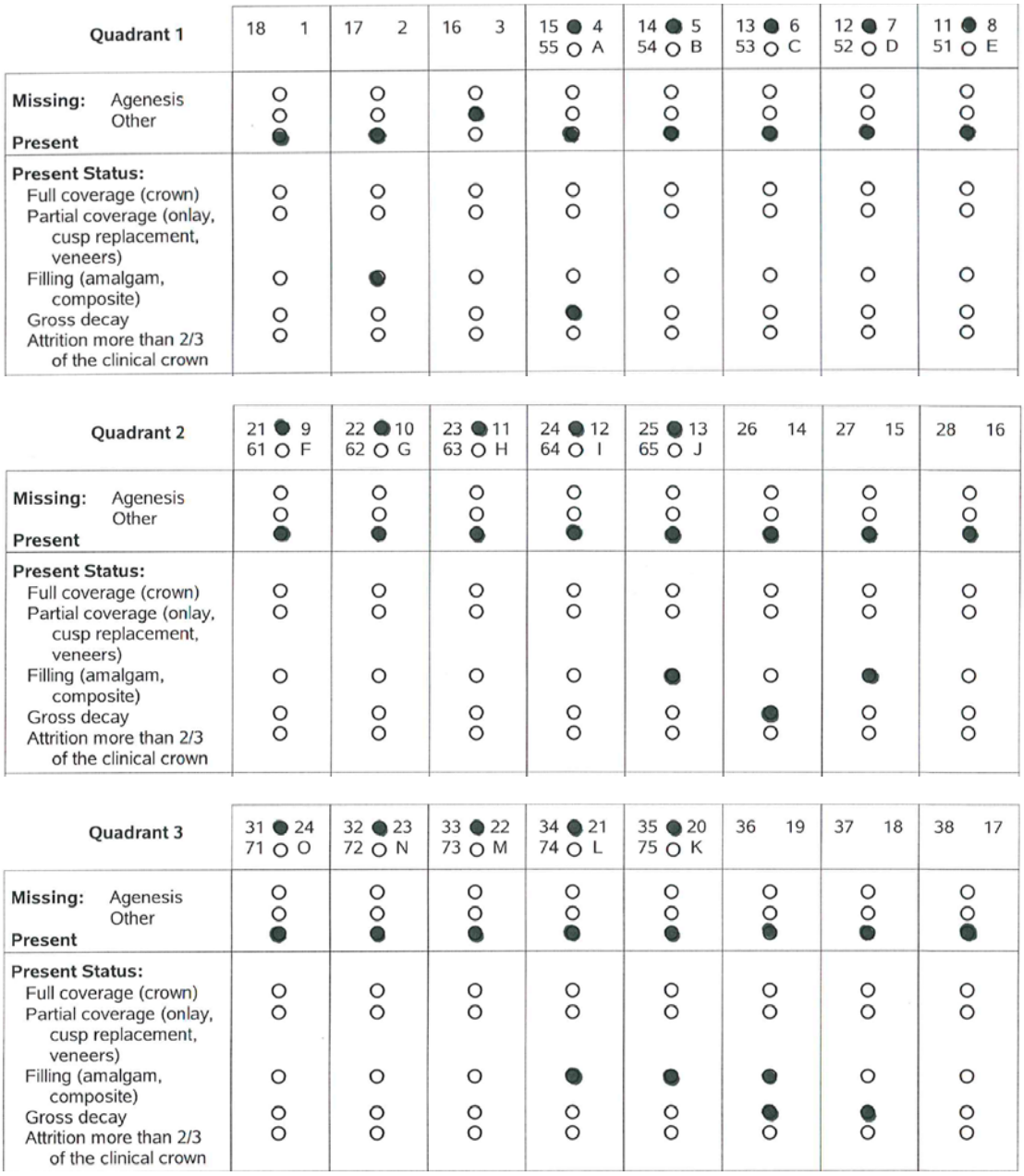
Quadrant 2	21 ○ 9 61 ● F	22 ○ 10 62 ● G	23 ○ 11 63 ● H	24 ○ 12 64 ● I	25 ○ 13 65 ● J	26 14	27 15	28 16
Missing: Agenesis	○	○	○	○	○	○	○	○
Other	○	○	○	○	○	●	●	●
Present	●	●	●	●	●	○	○	○
Present Status:								
Full coverage (crown)	○	○	○	○	○	○	○	○
Partial coverage (onlay, cusp replacement, veneers)	○	○	○	○	○	○	○	○
Filling (amalgam, composite)	○	○	○	○	○	○	○	○
Gross decay	●	●	○	●	●	○	○	○
Attrition more than 2/3 of the clinical crown	○	○	○	○	○	○	○	○

Quadrant 3	31 ○ 24 71 ● O	32 ○ 23 72 ● N	33 ○ 22 73 ● M	34 ○ 21 74 ● L	35 ○ 20 75 ● K	36 19	37 18	38 17
Missing: Agenesis	○	○	○	○	○	○	○	○
Other	○	○	○	○	○	●	●	●
Present	●	●	●	●	●	○	○	○
Present Status:								
Full coverage (crown)	○	○	○	○	○	○	○	○
Partial coverage (onlay, cusp replacement, veneers)	○	○	○	○	○	○	○	○
Filling (amalgam, composite)	○	○	○	○	○	○	○	○
Gross decay	○	○	○	●	●	○	○	○
Attrition more than 2/3 of the clinical crown	○	○	○	○	○	○	○	○

Quadrant 4	48 32	47 31	46 30	45 ○ 29 85 ● T	44 ○ 28 84 ● S	43 ○ 27 83 ● R	42 ○ 26 82 ● Q	41 ○ 25 81 ● P
Missing: Agenesis	○	○	○	○	○	○	○	○
Other	●	●	●	○	○	○	○	○
Present	○	○	○	●	●	●	●	●
Present Status:								
Full coverage (crown)	○	○	○	○	○	○	○	○
Partial coverage (onlay, cusp replacement, veneers)	○	○	○	○	○	○	○	○
Filling (amalgam, composite)	○	○	○	○	○	○	○	○
Gross decay	○	○	○	●	○	○	○	○
Attrition more than 2/3 of the clinical crown	○	○	○	○	○	○	○	○

Appendix Figure 5. Intra-oral photograph- Permanent Dentition

Appendix Figure 6. Intra-oral photograph evaluation form – Permanent Dentition



Quadrant 4	48 32	47 31	46 30	45 29 85 T	44 28 84 S	43 27 83 R	42 26 82 Q	41 25 81 P
Missing: Agenesis	○	○	○	○	○	○	○	○
Other	●	○	○	○	○	○	○	○
Present	○	●	●	●	●	●	●	●
Present Status:								
Full coverage (crown)	○	○	○	○	○	○	○	○
Partial coverage (onlay, cusp replacement, veneers)	○	○	○	○	○	○	○	○
Filling (amalgam, composite)	○	●	○	●	●	○	○	○
Gross decay	○	○	●	○	○	○	○	○
Attrition more than 2/3 of the clinical crown	○	○	○	○	○	○	○	○