

# Analyses

## Reliability analysis of scales

The internal reliability of each scale, i.e. that the items grouped within the scale measured the same concept, was tested using the Cronbach alpha test of inter-item reliability.

The Cronbach alpha values of the scales are shown in Table 32. For each scale,  $\alpha$  is above the level of 0.50 (which is recommended for inter-group comparisons), indicating adequate reliability for each of the scales.

**Table 32: Scale reliability analysis**

| Scale  | Cronbach's alpha, $\alpha$ |
|--|----------------------------|
| Ability to chew                              | 0.8730                     |
| Ability to speak                             | 0.8615                     |
| Oral and facial pain symptoms <sup>(a)</sup> | 0.6906                     |
| Other oral symptoms                          | 0.6814                     |
| Eating impact scale                          | 0.8169                     |
| Communication/social relations impact scale  | 0.8436                     |
| Activities of daily living impact scale      | 0.8401                     |
| Worry/concern impact scale                   | 0.8731                     |
| Shortened OHIP (total)                       | 0.9252                     |

(a) If remove 'Pain or discomfort from a denture',  $\alpha = 0.7702$

## Bivariate analyses

An initial analysis of the data was carried out to determine if any of the potential predictor variables (see section 3.3) should be considered for use in a multivariate model. Bivariate associations between the potential predictor variables and urgency of care were therefore examined. The results are displayed in Table 33.

**Table 33: Bivariate associations between independent variables and urgency of care**

| Symptom                                | Response | Urgency of care<br>(Per cent within urgency of care) |            |            |           | Total | Sig.  |      |
|--|----------|--|------------|------------|-----------|-------|-------|------|
|  |          | <1 month   | 1-3 months | 4-6 months | 7+ months |       |       |      |
| <b>Ability to chew</b>                 |          |  |            |            |           |       |       |      |
| Chew fresh carrot                      | No       | 33.7   | 23.0       | 17.3       | 11.5      | 18.7  | 0.000 | *    |
| Chew boiled vegetables                 | No       | 6.1  | 6.3        | 1.6        | 4.5       | 4.7   | 0.229 | n.s. |
| Chew fresh lettuce salad               | No       | 7.1  | 4.6        | 3.1        | 4.6       | 4.7   | 0.563 | n.s. |
| Chew firm foods                        | No       | 30.6   | 17.8       | 15.6       | 9.8       | 15.9  | 0.000 | *    |
| Bite off and chew a piece of apple     | No       | 31.6   | 18.9       | 17.3       | 11.5      | 17.3  | 0.000 | *    |
| Chew hamburger                         | No       | 14.4   | 10.4       | 7.9        | 6.6       | 8.9   | 0.107 | n.s. |
| <b>Ability to speak</b>                |          |  |            |            |           |       |       |      |
| Difficulty pronouncing words           | Yes      | 23.5   | 20.1       | 10.2       | 11.5      | 15.2  | 0.003 | *    |
| Difficulty speaking clearly            | Yes      | 17.3   | 16.2       | 10.9       | 9.5       | 12.6  | 0.076 | n.s. |
| Difficulty being understood            | Yes      | 13.3   | 15.0       | 7.8        | 7.4       | 10.2  | 0.034 | *    |
| <b>Oral and facial pain symptoms</b>   |          |  |            |            |           |       |       |      |
| Toothache                              | Yes      | 72.4   | 54.0       | 44.5       | 29.4      | 44.6  | 0.000 | *    |
| Pain in teeth with hot food or fluids  | Yes      | 50.0   | 45.4       | 32.0       | 21.8      | 33.7  | 0.000 | *    |
| Pain in teeth with cold food or fluids | Yes      | 75.5   | 57.7       | 43.0       | 38.1      | 49.3  | 0.000 | *    |
| Pain in teeth with sweet food          | Yes      | 49.0   | 32.8       | 22.2       | 15.4      | 25.9  | 0.000 | *    |
| Pain in jaw while chewing              | Yes      | 38.8   | 30.5       | 17.2       | 11.5      | 21.3  | 0.000 | *    |
| Pain in jaw when open mouth wide       | Yes      | 22.4   | 19.7       | 14.8       | 11.2      | 15.6  | 0.019 | *    |
| Pain in front of ear                   | Yes      | 29.6   | 27.0       | 19.5       | 12.9      | 20.1  | 0.000 | *    |
| Burning sensation in tongue/mouth      | Yes      | 8.2  | 8.7        | 5.5        | 3.1       | 5.7   | 0.060 | *    |
| Shooting pain in face or cheeks        | Yes      | 21.4   | 17.2       | 10.9       | 5.9       | 12.0  | 0.000 | *    |
| Pain or discomfort from denture        | Yes      | 47.6   | 39.6       | 29.5       | 18.9      | 29.9  | 0.023 | *    |
| <b>Other oral symptoms</b>             |          |  |            |            |           |       |       |      |
| Mouth ulcers                           | Yes      | 17.3   | 17.0       | 18.8       | 15.0      | 16.5  | 0.804 | n.s. |
| Cold sores                             | Yes      | 13.3   | 17.1       | 14.1       | 10.5      | 13.2  | 0.248 | n.s. |
| Sore gums                              | Yes      | 37.8   | 36.0       | 21.1       | 21.0      | 27.2  | 0.000 | *    |
| Bleeding gums                          | Yes      | 50.0   | 36.0       | 37.5       | 26.6      | 34.4  | 0.000 | *    |
| Bad breath                             | Yes      | 48.0   | 45.1       | 35.9       | 24.8      | 35.3  | 0.000 | *    |
| Dryness of mouth                       | Yes      | 40.8   | 42.8       | 36.7       | 30.1      | 36.1  | 0.032 | *    |
| Unpleasant taste                       | Yes      | 41.8   | 36.0       | 29.7       | 20.3      | 29.1  | 0.000 | *    |
| Changes in ability to taste            | Yes      | 16.3   | 18.2       | 5.6        | 6.7       | 10.8  | 0.000 | *    |
| Difficulty opening mouth wide          | Yes      | 22.4   | 19.7       | 14.8       | 11.2      | 15.6  | 0.019 | *    |
| Clicking/grating noise in jaw joint    | Yes      | 21.4   | 25.1       | 15.7       | 17.8      | 19.8  | 0.154 | n.s. |

\* Statistically significant chi-square  
n.s. Not statistically significant

(continued)

**Table 33: Bivariate associations between independent variables and urgency of care (continued)**

| <b>Eating impact scale</b>                                 |                               |      |      |      |      |      |       |   |  |
|--|-------------------------------|------|------|------|------|------|-------|---|--|
| Have been prevented from eating certain foods              | All the time                  | 9.2  | 3.4  | 4.7  | 0.7  | 3.4  | 0.000 | * |  |
|  | Very often                    | 12.2 | 8.0  | 3.1  | 1.4  | 5.0  |       |   |  |
|  | Often                         | 9.2  | 8.0  | 6.3  | 4.6  | 6.4  |       |   |  |
|  | Sometimes                     | 31.6 | 29.7 | 31.3 | 20.0 | 26.2 |       |   |  |
|  | Never                         | 37.8 | 50.9 | 54.7 | 73.3 | 59.0 |       |   |  |
| Have found enjoyment of food less than it used to be       | All the time                  | 8.2  | 5.7  | 4.7  | 1.4  | 4.1  | 0.000 | * |  |
|  | Very often                    | 12.2 | 7.4  | 3.9  | 2.5  | 5.4  |       |   |  |
|  | Often                         | 9.2  | 5.7  | 5.5  | 2.8  | 5.0  |       |   |  |
|  | Sometimes                     | 19.4 | 22.3 | 20.3 | 12.3 | 17.3 |       |   |  |
|  | Never                         | 51.0 | 58.9 | 65.6 | 81.1 | 68.2 |       |   |  |
| Has taken longer to finish a meal than other people        | All the time                  | 24.5 | 14.4 | 13.3 | 3.2  | 10.9 | 0.000 | * |  |
|  | Very often                    | 6.1  | 6.3  | 2.3  | 3.2  | 4.2  |       |   |  |
|  | Often                         | 8.2  | 9.2  | 8.6  | 2.5  | 6.1  |       |   |  |
|  | Sometimes                     | 14.3 | 12.6 | 11.7 | 8.4  | 10.9 |       |   |  |
|  | Never                         | 46.9 | 57.5 | 64.1 | 82.8 | 67.7 |       |   |  |
| <b>Communication/social relations impact</b>               |                               |      |      |      |      |      |       |   |  |
| Avoided eating with others                                 | All the time/very often/often | 16.3 | 9.1  | 4.7  | 1.8  | 6.3  | 0.000 |   |  |
|  | Sometimes                     | 6.1  | 9.1  | 7.8  | 0.7  | 5.0  |       |   |  |
|  | Never                         | 77.6 | 81.7 | 87.5 | 97.5 | 88.8 |       |   |  |
|  |                               |      |      |      |      |      |       |   |  |
| Were embarrassed by appearance or health of teeth or mouth | All the time/very often/often | 45.9 | 33.9 | 28.1 | 12.6 | 25.7 | 0.000 |   |  |
|  | Sometimes                     | 13.3 | 19.0 | 22.7 | 16.8 | 18.0 |       |   |  |
|  | Never                         | 40.8 | 47.1 | 49.2 | 70.5 | 56.4 |       |   |  |
| Avoided laughing or smiling                                | All the time/very often/often | 41.8 | 31.4 | 22.7 | 9.4  | 22.1 | 0.000 |   |  |
|  | Sometimes                     | 9.2  | 12.0 | 14.1 | 11.9 | 11.9 |       |   |  |
|  | Never                         | 49.0 | 56.6 | 63.3 | 78.7 | 65.9 |       |   |  |
| Avoided conversations with others                          | All the time/very often/often | 22.4 | 19.5 | 8.6  | 3.1  | 11.1 | 0.000 |   |  |
|  | Sometimes                     | 11.2 | 9.8  | 10.9 | 6.6  | 8.9  |       |   |  |
|  | Never                         | 66.3 | 70.7 | 80.5 | 90.2 | 80.0 |       |   |  |
| <b>Activities of daily living impact scale</b>             |                               |      |      |      |      |      |       |   |  |
| Have difficulty sleeping                                   | Yes                           | 68.4 | 39.4 | 36.7 | 16.8 | 33.6 | 0.000 |   |  |
|  | Never                         | 31.6 | 60.6 | 63.3 | 83.2 | 66.4 |       |   |  |
| Stay home more than usual                                  | Yes                           | 32.7 | 22.3 | 12.5 | 3.1  | 14.0 | 0.000 |   |  |
|  | Never                         | 67.3 | 77.7 | 87.5 | 96.9 | 86.0 |       |   |  |
| Stay in bed more than usual                                | Yes                           | 15.3 | 13.1 | 7.0  | 1.7  | 7.6  | 0.000 |   |  |
|  | Never                         | 84.7 | 86.9 | 93.0 | 98.3 | 92.4 |       |   |  |
| Take time off work   | Yes                           | 28.6 | 8.5  | 7.1  | 2.8  | 7.8  | 0.000 |   |  |
|  | Never                         | 71.4 | 91.5 | 92.9 | 97.2 | 92.2 |       |   |  |
| Be unable to do household chores                           | Yes                           | 20.4 | 12.6 | 8.6  | 2.5  | 8.7  | 0.000 |   |  |
|  | Never                         | 79.6 | 87.4 | 91.4 | 97.5 | 91.3 |       |   |  |
| Avoid usual leisure activities                             | Yes                           | 36.7 | 18.9 | 10.2 | 4.9  | 14.0 | 0.000 |   |  |
|  | Never                         | 63.3 | 81.1 | 89.8 | 95.1 | 86.0 |       |   |  |

\* Statistically significant chi-square  
n.s. Not statistically significant

(continued)

**Table 33: Bivariate associations between independent variables and urgency of care (continued)**

| <b>Worry/concern impact scale</b>        |              |      |      |      |      |      |       |      |  |
|--|--------------|------|------|------|------|------|-------|------|--|
| Worry about appearance of teeth or mouth | All the time | 34.7 | 18.3 | 16.4 | 7.7  | 15.9 | 0.000 | *    |  |
|  | Very often   | 14.3 | 11.4 | 7.8  | 4.2  | 8.2  |       |      |  |
|  | Often        | 10.2 | 16.6 | 14.1 | 15.4 | 14.7 |       |      |  |
|  | Sometimes    | 23.5 | 27.4 | 29.7 | 30.8 | 28.7 |       |      |  |
|  | Never        | 17.3 | 26.3 | 32.0 | 42.0 | 32.6 |       |      |  |
| Worry about health of teeth or mouth     | All the time | 36.7 | 20.0 | 16.4 | 6.7  | 16.2 | 0.000 | *    |  |
|  | Very often   | 14.3 | 14.9 | 10.2 | 6.3  | 10.4 |       |      |  |
|  | Often        | 12.2 | 24.0 | 19.5 | 20.8 | 20.1 |       |      |  |
|  | Sometimes    | 25.5 | 26.9 | 34.4 | 37.3 | 32.4 |       |      |  |
|  | Never        | 11.2 | 14.3 | 19.5 | 28.9 | 20.9 |       |      |  |
| <b>Other symptoms</b>                    |              |      |      |      |      |      |       |      |  |
| Pain worse in the middle of the day      | Yes          | 21.6 | 10.9 | 7.0  | 3.5  | 8.6  | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Pain at night                            | Yes          | 38.8 | 27.6 | 12.5 | 9.8  | 19.0 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Swelling on gums                         | Yes          | 31.6 | 22.7 | 16.4 | 8.0  | 16.7 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Swelling of face or neck                 | Yes          | 14.3 | 10.0 | 5.5  | 4.9  | 7.6  | 0.010 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A lost filling                           | Yes          | 27.6 | 25.6 | 13.3 | 7.0  | 15.8 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A lost crown                             | Yes          | 11.2 | 0.6  | 2.3  | 0.7  | 2.5  | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A broken filling                         | Yes          | 30.6 | 17.0 | 13.3 | 6.3  | 13.8 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A broken crown                           | Yes          | 9.2  | 0.6  | 2.3  | 2.4  | 2.9  | 0.001 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A loose tooth                            | Yes          | 17.5 | 14.0 | 10.9 | 1.7  | 8.8  | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A chipped tooth                          | Yes          | 35.1 | 16.9 | 19.5 | 11.5 | 17.7 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A cracked tooth                          | Yes          | 25.5 | 12.3 | 5.5  | 5.2  | 10.0 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| A broken tooth from an accident          | Yes          | 4.1  | 3.5  | 0.8  | 1.0  | 2.0  | 0.099 | n.s. |  |
|  | No           |      |      |      |      |      |       |      |  |
| High temperature                         | Yes          | 8.2  | 11.0 | 6.3  | 5.6  | 7.5  | 0.172 | n.s. |  |
|  | No           |      |      |      |      |      |       |      |  |
| <b>Shortened OHIP</b>                    |              |      |      |      |      |      |       |      |  |
| Trouble pronouncing words                | Yes          | 26.5 | 21.7 | 14.8 | 8.4  | 15.6 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Sense of taste worsened                  | Yes          | 35.7 | 26.9 | 15.6 | 8.4  | 18.4 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Painful aching in mouth                  | Yes          | 75.5 | 66.9 | 51.2 | 34.6 | 51.7 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Uncomfortable to eat any foods           | Yes          | 69.4 | 63.4 | 53.1 | 33.2 | 49.8 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Have been self-conscious                 | Yes          | 72.4 | 56.0 | 52.3 | 30.5 | 47.1 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Felt tense                               | Yes          | 54.1 | 44.0 | 40.6 | 18.9 | 34.4 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Diet has been unsatisfactory             | Yes          | 37.8 | 29.7 | 21.1 | 8.0  | 20.2 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Have had to interrupt meals              | Yes          | 48.0 | 35.4 | 28.1 | 11.2 | 25.8 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Difficult to relax                       | Yes          | 63.3 | 39.4 | 33.9 | 16.4 | 32.2 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Been a bit embarrassed                   | Yes          | 62.2 | 49.1 | 46.9 | 25.5 | 40.8 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Been a bit irritable with others         | Yes          | 45.4 | 33.1 | 34.4 | 12.6 | 26.5 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Difficulty doing usual jobs              | Yes          | 27.6 | 21.7 | 14.1 | 5.2  | 14.3 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Life in general has been less satisfying | Yes          | 49.0 | 37.1 | 29.7 | 12.9 | 27.4 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Totally unable to function               | Yes          | 22.4 | 17.7 | 10.9 | 4.9  | 11.8 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| <b>Other questions</b>                   |              |      |      |      |      |      |       |      |  |
| Smoker                                   | Yes          | 45.9 | 41.1 | 28.9 | 24.1 | 32.5 | 0.000 | *    |  |
|  | No           |      |      |      |      |      |       |      |  |
| Taking any regular medication            | Yes          | 51.0 | 48.0 | 62.5 | 51.9 | 52.8 | 0.084 | n.s. |  |
|  | No           |      |      |      |      |      |       |      |  |
| Diabetic                                 | Yes          | 2.0  | 4.0  | 4.7  | 5.6  | 4.5  | 0.518 | n.s. |  |
|  | No           |      |      |      |      |      |       |      |  |

\* Statistically significant chi-square  
n.s. Not statistically significant

(continued)

**Table 33: Bivariate associations between independent variables and urgency of care (continued)**

| <b>Sociodemographic variables</b> |                             |         |      |      |      |      |       |      |     |       |
|-----------------------------------|-----------------------------|---------|------|------|------|------|-------|------|-----|-------|
| Age group                         | 18–24 years                 | 10.3    | 3.4  | 7.0  | 12.3 | 8.8  | 0.001 | *    |     |       |
|                                   | 25–44 years                 | 51.5    | 47.1 | 34.4 | 37.5 | 41.4 |       |      |     |       |
|                                   | 45–64 years                 | 26.8    | 31.0 | 29.7 | 26.0 | 28.1 |       |      |     |       |
|                                   | 65+ years                   | 11.3    | 18.4 | 28.9 | 24.2 | 21.8 |       |      |     |       |
|                                   | Maximum education           | Primary | 6.2  | 6.3  | 7.8  | 6.3  |       |      | 6.6 | 0.390 |
| Some secondary                    | 39.2                        | 32.0    | 27.3 | 32.2 | 32.2 |      |       |      |     |       |
| Completed secondary               | 28.9                        | 26.9    | 30.5 | 24.1 | 26.7 |      |       |      |     |       |
| Some university                   | 5.2                         | 5.1     | 6.3  | 9.8  | 7.3  |      |       |      |     |       |
| Completed university              | 10.3                        | 9.1     | 6.3  | 6.3  | 7.6  |      |       |      |     |       |
| Some TAFE                         | 5.2                         | 6.3     | 6.3  | 8.4  | 7.0  |      |       |      |     |       |
| Completed TAFE                    | 5.2                         | 12.0    | 12.5 | 12.2 | 11.2 |      |       |      |     |       |
| Other                             | –                           | 2.3     | 3.1  | 0.7  | 1.5  |      |       |      |     |       |
| Usual/previous occupation         | Manager/professional        | 10.5    | 11.8 | 11.3 | 11.7 | 11.5 | 0.035 | *    |     |       |
|                                   | Para-professional/trade     | 11.6    | 15.9 | 27.4 | 24.9 | 21.1 |       |      |     |       |
|                                   | Clerk/sales/driver/labourer | 57.9    | 51.2 | 40.3 | 43.6 | 47.0 |       |      |     |       |
|                                   | Self-employed               | –       | 2.4  | 2.4  | 1.1  | 1.5  |       |      |     |       |
|                                   | Home duties                 | 11.6    | 13.5 | 9.7  | 7.7  | 10.1 |       |      |     |       |
|                                   | Other                       | 8.4     | 5.3  | 8.9  | 11.0 | 8.8  |       |      |     |       |
| Sex of patient                    | Female                      | 65.3    | 48.0 | 54.7 | 59.8 | 57.6 | 0.131 | n.s. |     |       |
|                                   | Male                        | 34.7    | 52.0 | 45.3 | 40.2 | 42.4 |       |      |     |       |
| Language mainly spoken at home    | English                     | 82.7    | 81.1 | 82.8 | 87.1 | 84.1 | 0.342 | n.s. |     |       |
|                                   | Other                       | 17.3    | 18.9 | 17.2 | 12.9 | 15.9 |       |      |     |       |
| Country of birth                  | Australia                   | 61.2    | 55.7 | 54.7 | 57.3 | 57.0 | 0.773 | n.s. |     |       |
|                                   | Other                       | 38.8    | 44.3 | 45.3 | 42.7 | 43.0 |       |      |     |       |
| Dental Anxiety Scale (DAS) score  | DAS score <13               | 73.5    | 87.4 | 82.8 | 89.9 | 85.6 | 0.001 | *    |     |       |
|                                   | DAS score ≥13               | 26.5    | 12.6 | 17.2 | 10.1 | 14.4 |       |      |     |       |
| <b>Dental visiting factors</b>    |                             |         |      |      |      |      |       |      |     |       |
| Usual reason for dental visit     | Check-up                    | 8.2     | 28.2 | 28.9 | 54.4 | 36.5 | 0.000 | *    |     |       |
|                                   | Problem                     | 87.6    | 69.4 | 67.2 | 40.0 | 59.3 |       |      |     |       |
| Time since last dental visit      | Check-up/problem            | 4.1     | 2.4  | 3.9  | 5.6  | 4.3  | 0.000 | *    |     |       |
|                                   | <12 months                  | 51.0    | 40.8 | 45.7 | 23.9 | 36.1 |       |      |     |       |
|                                   | 1–<2 years                  | 14.3    | 16.1 | 16.5 | 21.4 | 18.1 |       |      |     |       |
|                                   | 2–<3 years                  | 8.2     | 13.8 | 10.2 | 16.8 | 13.6 |       |      |     |       |
|                                   | 3–<5 years                  | 13.3    | 11.5 | 12.6 | 18.6 | 14.9 |       |      |     |       |
|                                   | 5+ years                    | 13.3    | 17.2 | 15.0 | 19.3 | 17.1 |       |      |     |       |
| Place of last dental visit        | Never                       | 0.0     | 0.6  | 0.00 | 0.0  | 0.1  | 0.046 | *    |     |       |
|                                   | Private practice            | 24.5    | 30.1 | 25.2 | 39.9 | 32.4 |       |      |     |       |
|                                   | Public hospital/clinic      | 73.5    | 64.7 | 64.6 | 50.9 | 60.2 |       |      |     |       |
|                                   | School dental service       | 2.0     | 3.5  | 7.9  | 7.8  | 5.9  |       |      |     |       |
| Frequency of dental visits        | Other                       | 0.0     | 1.7  | 2.4  | 1.4  | 1.5  | 0.069 | n.s. |     |       |
|                                   | >2 times a year             | 8.2     | 5.8  | 3.1  | 5.6  | 5.6  |       |      |     |       |
|                                   | 2 times a year              | 6.2     | 6.9  | 9.4  | 7.4  | 7.5  |       |      |     |       |
|                                   | Once a year                 | 15.5    | 12.7 | 14.2 | 17.6 | 15.4 |       |      |     |       |
|                                   | Once every 2 years          | 19.6    | 27.2 | 32.3 | 32.4 | 29.2 |       |      |     |       |
|                                   | Once every 5 years          | 26.8    | 20.2 | 18.9 | 23.6 | 22.3 |       |      |     |       |
| < Once every 5 years              | 23.7                        | 27.2    | 22.0 | 13.4 | 20.0 |      |       |      |     |       |

\* Statistically significant chi-square

n.s. Not statistically significant

Bivariate associations between the subjective oral health status and OHIP scales and the urgency of care were also examined. The results are presented in Table 34.

The 'Oral and facial pain symptoms' and 'Other oral symptoms' scales are a 10-item scale with 'yes' and 'no' response options whereby 'yes' is represented by 1 and 'no' by 0. Adding the responses to each item yields a total score ranging from 0 to 10. Zero represents no oral and facial pain symptoms or any other oral symptoms, while 10 represents high experience of oral and facial pain symptoms and other oral symptoms. The 'Ability to chew' and 'Ability to speak' scales are 6-item and 3-item scales respectively. The mean number of oral symptoms for each urgency of care category is presented in Table 34.

The 'Activities of daily living scale' and 'Worry/concern impact scale' consisted of five and two items respectively. Responses to each item were made on a Likert-type scale whereby respondents were asked to indicate their level of experience with each of the items in question. The response format was a 5-point scale (scored from 1 to 5) ranging from 'all the time' to 'never'. The mean score for each item by category of urgency of care is presented in Table 34.

**Table 34: Bivariate associations between subjective oral health scales and urgency of care**

| Scale  |          | Urgency of care |            |            |           |       | Sig.      |
|--|----------|-----------------|------------|------------|-----------|-------|-----------|
|  |          | <1 month        | 1-3 months | 4-6 months | 7+ months | Total |           |
| <b>Ability to chew</b><br>(‘yes’ responses)        | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 4.76            | 5.17       | 5.35       | 5.51      | 5.28  |           |
|  | Std Dev. | 1.79            | 1.55       | 1.31       | 1.33      | 1.48  |           |
| <b>Ability to chew</b><br>(‘no’ responses)         | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 1.24            | 0.83       | 0.65       | 0.49      | 0.72  |           |
|  | Std Dev. | 1.79            | 1.55       | 1.31       | 1.33      | 1.48  |           |
| <b>Ability to speak</b>                            | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.008 *** |
|  | Mean     | 0.54            | 0.51       | 0.29       | 0.28      | 0.38  |           |
|  | Std Dev. | 0.99            | 1.04       | 0.73       | 0.78      | 0.88  |           |
| <b>Eating impact scale</b>                         | Valid n  | 98              | 175        | 128        | 285       | 686   | 0.000 *** |
|  | Mean     | 3.74            | 4.10       | 4.26       | 4.66      | 4.31  |           |
|  | Std Dev. | 1.26            | 1.07       | 1.02       | 0.65      | 1.00  |           |
| <b>Communication/social relations impact scale</b> | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 3.82            | 4.16       | 4.36       | 4.69      | 4.37  |           |
|  | Std Dev. | 1.27            | 1.07       | 0.89       | 0.69      | 0.98  |           |
| <b>Oral and facial pain symptoms</b>               | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 3.78            | 3.02       | 2.20       | 1.54      | 2.36  |           |
|  | Std Dev. | 2.20            | 2.44       | 2.03       | 1.78      | 2.23  |           |
| <b>Other oral symptoms</b>                         | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 3.09            | 2.88       | 2.30       | 1.84      | 2.37  |           |
|  | Std Dev. | 2.13            | 2.54       | 1.93       | 1.78      | 2.13  |           |
| <b>Activities of daily living impact scale</b>     | Valid n  | 98              | 175        | 128        | 284       | 685   | 0.000 *** |
|  | Mean     | 4.51            | 4.67       | 4.82       | 4.91      | 4.77  |           |
|  | Std Dev. | 0.57            | 0.63       | 0.32       | 0.29      | 0.47  |           |
| <b>Worry/concern impact scale</b>                  | Valid n  | 98              | 175        | 128        | 284       | 685   | 0.000 *** |
|  | Mean     | 2.67            | 3.16       | 3.42       | 3.86      | 3.43  |           |
|  | Std Dev. | 1.45            | 1.30       | 1.32       | 1.07      | 1.30  |           |
| <b>OHIP (total)</b>                                | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 3.76            | 4.06       | 4.29       | 4.65      | 4.31  |           |
|  | Std Dev. | 0.95            | 0.89       | 0.77       | 0.54      | 0.82  |           |
| <b>Functional limitation scale</b>                 | Valid n  | 98              | 175        | 128        | 285       | 686   | 0.000 *** |
|  | Mean     | 4.32            | 4.43       | 4.71       | 4.82      | 4.63  |           |
|  | Std Dev. | 0.93            | 0.96       | 0.61       | 0.55      | 0.77  |           |
| <b>Physical pain scale</b>                         | Valid n  | 98              | 175        | 127        | 286       | 686   | 0.000 *** |
|  | Mean     | 3.13            | 3.41       | 3.86       | 4.30      | 3.82  |           |
|  | Std Dev. | 1.26            | 1.20       | 1.08       | 0.95      | 1.18  |           |
| <b>Psychological discomfort scale</b>              | Valid n  | 98              | 175        | 128        | 285       | 686   | 0.000 *** |
|  | Mean     | 3.22            | 3.67       | 3.85       | 4.44      | 3.96  |           |
|  | Std Dev. | 1.40            | 1.37       | 1.28       | 0.90      | 1.26  |           |
| <b>Physical disability scale</b>                   | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 3.92            | 4.23       | 4.48       | 4.80      | 4.47  |           |
|  | Std Dev. | 1.28            | 1.10       | 0.91       | 0.60      | 0.97  |           |
| <b>Psychological disability scale</b>              | Valid n  | 98              | 175        | 127        | 286       | 686   | 0.000 *** |
|  | Mean     | 3.43            | 3.94       | 4.09       | 4.56      | 4.15  |           |
|  | Std Dev. | 1.26            | 1.16       | 1.07       | 0.78      | 1.09  |           |
| <b>Social disability scale</b>                     | Valid n  | 97              | 175        | 128        | 286       | 686   | 0.000 *** |
|  | Mean     | 4.20            | 4.37       | 4.51       | 4.83      | 4.56  |           |
|  | Std Dev. | 1.04            | 1.03       | 0.83       | 0.54      | 0.86  |           |
| <b>Handicap scale</b>                              | Valid n  | 98              | 175        | 128        | 286       | 687   | 0.000 *** |
|  | Mean     | 4.13            | 4.37       | 4.58       | 4.81      | 4.56  |           |
|  | Std Dev. | 1.10            | 1.01       | 0.77       | 0.56      | 0.86  |           |

\*\*\* Statistically significant ANOVA

A number of variables had a significant association with urgency of care and are marked by asterisks. Significant variables from the bivariate analyses will be further examined by means of logistic regression so as to develop a prediction model for urgency of care.

## Logistic regression

To further examine factors associated with the urgency of care, logistic regression analysis was performed using a range of predictor variables. Predictor variables with a significant bivariate association with urgency of care (see section 3.4) were entered in a binary logistic regression in order to determine the strengths of the independent association of these variables. These predictor variables included patient characteristics (e.g. age, sex), subjective oral health status indicators (e.g. experience of pain or other oral symptoms) and oral health impact profile (OHIP) scale.

Note: Although occupation has a significant association with urgency of care, it will not be included in the models since relative need should really be determined by reported symptoms and should not be influenced by the socioeconomic characteristics of the patient.

For the purpose of this analysis, urgency of care has been dichotomised (since the outcome variable in a logistic regression is binary or dichotomous) and two logistic regression models will be fitted, one for each of the new urgency of care variables:

| Urgency of care |   | New urgency of care |                |
|-----------------|---|---------------------|----------------|
| 1 = <1 month    | } | <b>Model 1</b>      | <b>Model 2</b> |
| 2 = 1–3 months  |   | 1 = <6 months       | 1 = ≤3 months  |
| 3 = 4–6 months  |   | 0 = 7+ months       | 0 = 7+ months  |
| 4 = 7+ months   |   |                     |                |

### Model 1: New urgency of care = ≤6 months or 7+ months

Of the variables and scales with a statistically significant bivariate association with urgency of care, four were significant in the binary logistic regression. The logistic regression coefficients were used to estimate odds ratios for each of the independent variables in the model. The coefficients and odds ratios for urgency of care are presented in Table 35.

The odds ratio indicated that persons who experienced oral and facial pain symptoms were 1.2 times more likely to require treatment within 6 months compared to those who did not have these symptoms.

Persons who reported higher OHIP scores were less likely to require general care within 6 months than those who reported lower scores (N.B. responses to each item in the OHIP scale were made on a 5-point Likert scale, scored from 1 to 5, whereby a score of 1 represents high experience of symptoms while 5 represents no experience of symptoms).

Those who reported a problem as their usual reason for visiting the dentist had 2.3 times the odds of requiring general dental treatment within 6 months compared to those who reported a check-up as their usual reason for visiting the dentist.

Time since last visit was also a significant predictor of urgency of care in the logistic model. It was found that persons who last visited a dentist 12 months ago were 2.0 times the odds of requiring general dental care within 6 months compared to those who last visited 3 or more years ago. (Note that those who last visited a dentist 12 months ago would have visited for emergency care since the inclusion criteria for the general RNI sample states that patients should not have visited the dentist for routine dental care in the last year).

**Table 35: Logistic regression coefficients for model 1**

| Variable                             | B      | S.E.  | P-value | OR     | Lower | Upper | Sig. |
|--------------------------------------|--------|-------|---------|--------|-------|-------|------|
| <b>Oral and facial pain symptoms</b> | 0.147  | 0.052 | 0.004   | 1.158  | 1.047 | 1.282 | *    |
| <b>Shortened OHIP</b>                | -0.727 | 0.163 | 0.000   | 0.483  | 0.351 | 0.666 | *    |
| <b>Usual reason for dental visit</b> |        |       | 0.000   |        |       |       | *    |
| Check-up                             | REF.   |       |         |        |       |       |      |
| Problem                              | 0.837  | 0.193 | 0.000   | 2.309  | 1.581 | 3.373 | *    |
| Check-up/problem                     | -0.158 | 0.444 | 0.722   | 0.854  | 0.357 | 2.040 |      |
| <b>Time since last dental visit</b>  |        |       | 0.005   |        |       |       | *    |
| <12 months                           | 0.688  | 0.217 | 0.001   | 1.990  | 1.302 | 3.042 | *    |
| 1-<3 years                           | 0.193  | 0.215 | 0.370   | 1.213  | 0.796 | 1.848 |      |
| 3+ years                             | REF.   |       |         |        |       |       |      |
| <b>Smoker</b>                        |        |       |         |        |       |       |      |
| Yes/occasionally                     | -0.329 | 0.196 | 0.094   | 0.720  | 0.490 | 1.058 | n.s. |
| No                                   | REF.   |       |         |        |       |       |      |
| <b>Model constant</b>                | 3.006  | 0.872 | 0.001   | 20.202 |       |       |      |

Analysis used n = 678 cases with complete data on all variables

REF. Reference category for odds ratio

\* Statistically significant

n.s. Not statistically significant

In terms of the logistic regression equation, the results in Table 35 can be represented as followed:

$$P(\text{'urgent'}) = \frac{1}{1 + e^{-(b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5)}}$$

(see Table 36 for interpretation of values in this equation).

**Table 36: Independent predictor variables for Model 1: response values, logistic regression beta coefficients and standard errors**

| i | Independent variable          | Response value (x <sub>i</sub> )                                  | Beta coefficient (b <sub>i</sub> ) | SE             |
|---|-------------------------------|---|------------------------------------|----------------|
| 0 | Model constant                | ..  | 3.006                              | 0.872          |
| 1 | Oral and facial pain symptoms | Continuous variable, values range (calculate a score)             | 0.147                              | 0.052          |
| 2 | Shortened OHIP                | Continuous variable, values range (calculate a score)             | -0.727                             | 0.163          |
| 3 | Usual reason for dental visit | 1 = Check-up <sup>†</sup><br>2 = Problem<br>3 = Check-up/ problem | 0.837<br>-0.158                    | 0.193<br>0.444 |
| 4 | Time since last dental visit  | 1 = <12 months<br>2 = 1–<3 years<br>3 = 3+ years <sup>†</sup>     | 0.688<br>0.193                     | 0.217<br>0.215 |
| 5 | Smoker                        | 1 = Yes<br>0 = No <sup>†</sup>                                    | -0.329                             | 0.196          |

† Reference category

Since the results of logistic regression analysis are in terms of probability of a particular outcome (e.g. needing to be seen within 6 months), the cut-off value chosen for assignment to a category is critical in evaluating the success of the model.

### Model 2: New urgency of care = ≤3 months or 4+ months

Of the variables and scales with a statistically significant bivariate association with urgency of care, seven were significant in the binary logistic regression. The logistic regression coefficients were used to estimate odds ratios for each of the independent variables in the model. The coefficients and odds ratios for urgency of care are presented in Table 36.

The odds ratio indicated that persons who experienced oral and facial pain symptoms were 1.2 times more likely to require treatment within 3 months compared to those who did not have these symptoms.

Persons who reported higher OHIP scores were less likely to require general care within 3 months than those who reported lower scores (N.B. responses to each item in the OHIP scale were made on a 5-point Likert scale, scored from 1 to 5, whereby a score of 1 represents high experience of symptoms while 5 represents no experience of symptoms).

Those who reported a problem as their usual reason for visiting the dentist were 1.7 times more likely to require general dental treatment within 3 months compared to those who reported a check-up as their usual reason for visiting the dentist.

People who last visited a SDS clinic or other clinic (not private) were less likely to require care within 3 months compared to people who last visited a public dental clinic.

Experience of a lost filling and loose tooth were also significant predictors of urgency of care in the logistic model. In fact, those who reported having a lost filling or loose

tooth in the last four weeks had just over 2.0 times the odds of requiring care within 3 months compared to those who did not report these symptoms.

Lastly, smokers had 1.8 times the odds of requiring general dental care within 3 months compared to non-smokers.

**Table 37: Logistic regression coefficients for model 2**

| Variable                             | B      | S.E.  | P-value | OR    | Lower | Upper | Sig. |
|--------------------------------------|--------|-------|---------|-------|-------|-------|------|
| <b>Oral and facial pain symptoms</b> | 0.169  | 0.049 | 0.001   | 1.184 | 1.074 | 1.304 | *    |
| <b>Shortened OHIP</b>                | -0.457 | 0.138 | 0.001   | 0.633 | 0.483 | 0.830 | *    |
| <b>Usual reason for dental visit</b> |        |       | 0.020   |       |       |       | *    |
| Check-up                             | REF.   |       |         |       |       |       |      |
| Problem                              | 0.514  | 0.207 | 0.013   | 1.671 | 1.114 | 2.509 | *    |
| Check-up/problem                     | -0.260 | 0.505 | 0.606   | 0.771 | 0.287 | 2.073 |      |
| <b>Place of last dental visit</b>    |        |       | 0.029   |       |       |       | *    |
| Private practice                     | -0.324 | 0.195 | 0.096   | 0.723 | 0.493 | 1.059 |      |
| Public hospital/clinic               | REF.   | 0.415 | 0.020   | 0.381 | 0.169 | 0.860 | *    |
| SDS/other                            | -0.964 |       |         |       |       |       |      |
| <b>Lost filling</b>                  |        |       |         |       |       |       |      |
| Yes                                  | 0.734  | 0.251 | 0.003   | 2.084 | 1.274 | 3.408 | *    |
| No                                   | REF.   |       |         |       |       |       |      |
| <b>Loose tooth</b>                   |        |       |         |       |       |       |      |
| Yes                                  | 0.710  | 0.328 | 0.030   | 2.033 | 1.069 | 3.866 | *    |
| No                                   | REF.   |       |         |       |       |       |      |
| <b>Smoker</b>                        |        |       |         |       |       |       |      |
| Yes                                  | 0.592  | 0.192 | 0.002   | 1.808 | 1.241 | 2.634 | *    |
| No                                   | REF.   |       |         |       |       |       |      |
| <b>Model constant</b>                | 0.586  | 0.700 | 0.403   | 1.796 |       |       |      |

Analysis used n = 669 cases with complete data on all variables

REF. Reference category for odds ratio

\* Statistically significant

n.s. Not statistically significant

In terms of the logistic regression equation, the results in the Table 37 can be represented as followed:

$$P(\text{'urgent'}) = \frac{1}{1 + e^{-(b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7)}}$$

(see Table 38 for interpretation of values in this equation).

**Table 38: Independent predictor variables for Model 2: response values, logistic regression beta coefficients and standard errors**

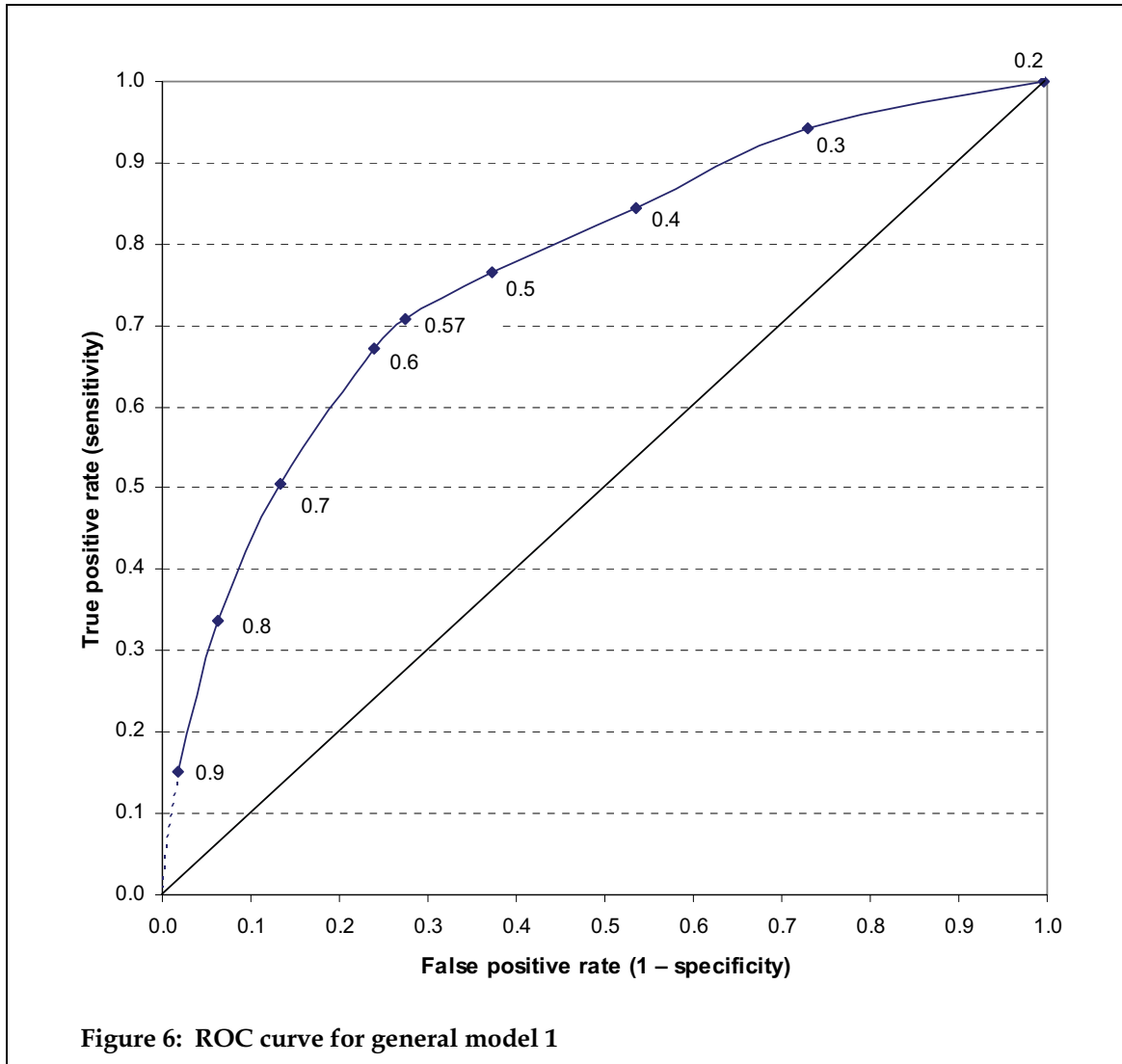
| <b>i</b> | <b>Independent variable</b>   | <b>Response value (x<sub>i</sub>)</b>                 | <b>Beta coefficient (b<sub>i</sub>)</b> | <b>SE</b> |
|----------|-------------------------------|---|---|-----------|
| 0        | Model constant                | ..  | 0.586                                   | 0.700     |
| 1        | Oral and facial pain symptoms | Continuous variable, values range (calculate a score) | 0.169                                   | 0.049     |
| 2        | Shortened OHIP                | Continuous variable, values range (calculate a score) | -0.457                                  | 0.138     |
| 3        | Usual reason for dental visit | 1 = Check-up <sup>†</sup>                             | 0.514                                   | 0.207     |
|          |                               | 2 = Problem   | -0.260                                  | 0.505     |
|          |                               | 3 = Check-up/ problem                                 | -0.324                                  | 0.195     |
| 4        | Place of last dental visit    | 1 = Private practice                                  | -0.964                                  | 0.415     |
|          |                               | 2 = Public hospital/ clinic <sup>†</sup>              |   |           |
|          |                               | 3 = SDS/other   |   |           |
| 5        | A lost filling                | 1=Yes<br>0=No <sup>†</sup>                            | 0.734                                   | 0.251     |
| 6        | A loose tooth                 | 1=Yes<br>0=No <sup>†</sup>                            | 0.710                                   | 0.328     |
| 7        | Smoker                        | 1=Yes<br>0=No <sup>†</sup>                            | 0.592                                   | 0.192     |

† Reference category

## ROC curves

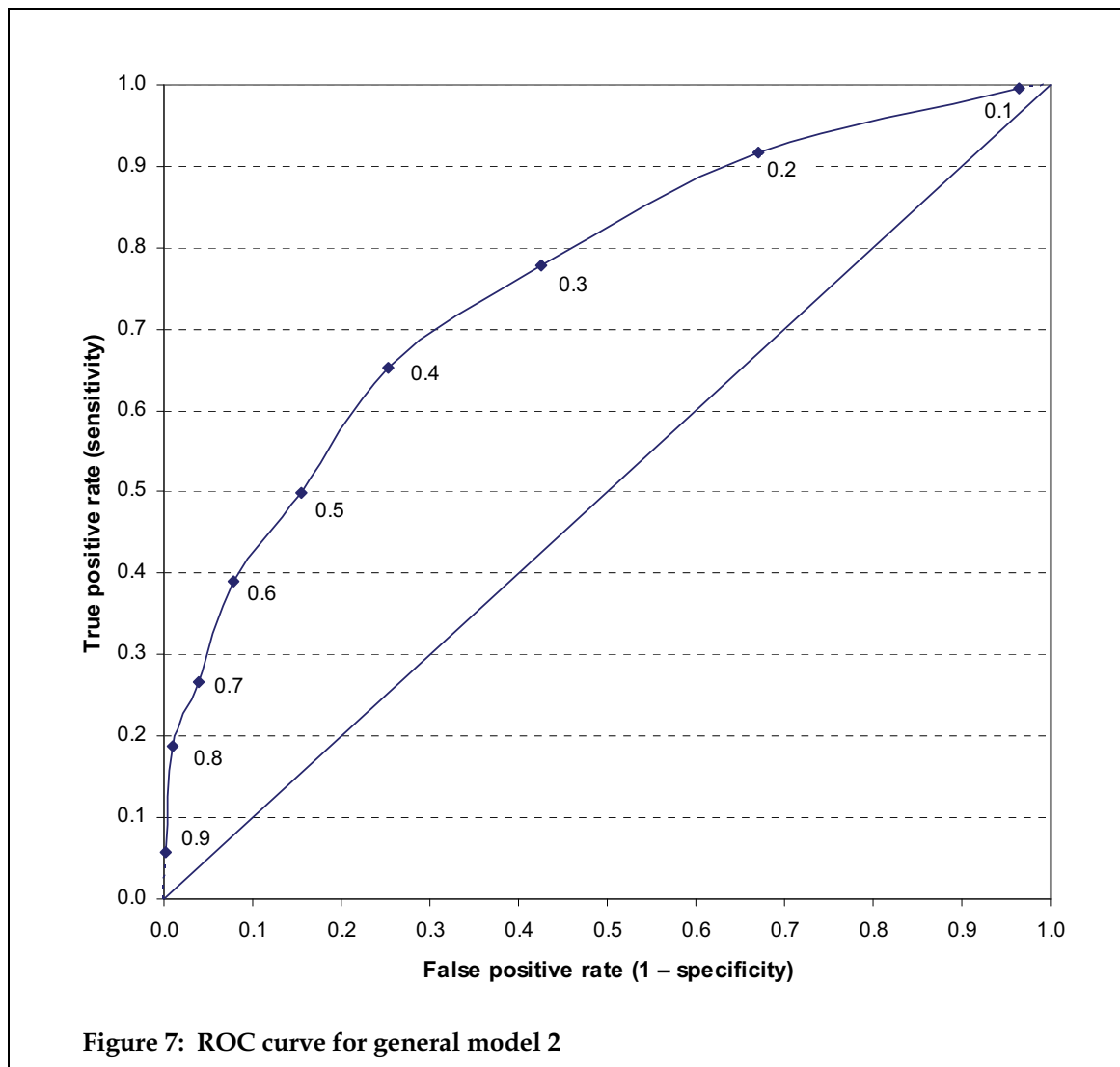
### ROC curve for general model 1

The ROC curve for general model 1 examining urgency of  $\leq 6$  months vs  $7+$  months is shown in Figure 6. The cut-off values on the curve represent the probability of needing treatment within 6 months.



## ROC curve for general model 2

The ROC curve for general model 2 is shown in Figure 7.



## Results – diagnostic test indicators

### General model 1

Sensitivity, specificity, positive predictive values (PV+) and negative predictive values (PV-) calculated for general model 1 at varying cut-off values are presented in Table 39.

**Table 39: Sensitivity, specificity and predictive values for general model 1**

| Cut-off | Sensitivity | Specificity | PV+  | PV-  |
|---------|-------------|-------------|------|------|
| 0.2     | 1.00        | 0.004       | 0.58 | 1.00 |
| 0.3     | 0.94        | 0.27        | 0.64 | 0.77 |
| 0.4     | 0.85        | 0.46        | 0.69 | 0.68 |
| 0.5     | 0.77        | 0.63        | 0.74 | 0.66 |
| 0.57    | 0.71        | 0.73        | 0.78 | 0.64 |
| 0.6     | 0.67        | 0.76        | 0.80 | 0.63 |
| 0.7     | 0.51        | 0.87        | 0.84 | 0.56 |
| 0.8     | 0.34        | 0.94        | 0.88 | 0.50 |
| 0.9     | 0.15        | 0.98        | 0.92 | 0.46 |

As can be seen from Table 39, as the cut-off value is lowered, the sensitivity increases but the specificity decreases. Hence, fewer false negative results are obtained but the proportion of false positive test results increases. The opposite is true when higher cut-off values are selected.

Suppose a low cut-off value of 0.3 is selected. Of the patients who actually require care within 6 months, 94% will have positive test results. This is the percentage of 'true positive' results. The remaining 6% of patients requiring care within 6 months have negative test results but are nonetheless in need of care within the 6 months timeframe. This is the percentage of patients with 'false negative' test results, i.e. 6% of patients in need of dental care within 6 months will be misclassified as able to wait 7 or more months for treatment.

Of the patients who are not urgent i.e. can wait 7 or more months for treatment, 27% will have negative test results. This is the percentage of 'true negative' results. The remaining 73% of non-urgent patients have positive test results but are not urgent. This is the percentage of patients with 'false positive' test results i.e. 73% of patients who are able to wait 7 or more months for treatment will be misclassified and receive care within 6 months.

If the test is positive, the probability of being urgent is 64% (i.e. a positive predictive value of 64% means that 64 of 100 patients with positive test results will likely require care within 6 months). Hence, there is a 36% chance that the patient is not urgent. If the test is negative, the probability of needing care within 6 months is 23%, which indicates a 77% chance that the patient is not urgent.

#### *Example interpretation of general model 1*

Suppose there are 100 patients presenting for general dental care. According to the assessing dentist, approximately 58% require care within 6 months and a further 42% are able to wait a longer period of 7 or more months for treatment (see Table 29).

Consider what happens to these 100 patients when a cut-off point of 0.3 is selected.

### Decision 1: cut-off = 0.3

| Cut-off | Sensitivity | Specificity | PV+  | PV-  |
|---------|-------------|-------------|------|------|
| 0.3     | 0.94        | 0.27        | 0.64 | 0.77 |

Using a cut-off value of 0.3, the model sensitivity is 94%. The specificity is 27%, indicating that of those 58 patients actually requiring care within 6 months, 55 (94%) will be correctly identified as more urgent and will therefore be seen within 6 months, but 3 patients (6%) will be misclassified and receive care in 7 or more months time (i.e. patients end up with false negative results).

Of the 42 patients who are considered able to wait 7 or more months for treatment, 11 (27%) without urgent need will actually test negative but 31 (73%) will be misclassified (i.e. 31 patients end up with false positive results) and receive care within 6 months.

These results are summarised in Table 40.

**Table 40: Example using general model 1 with cut-off = 0.3 to assign priority to 100 patients presenting for general dental care**

|   |               | Clinician urgency<br>(clinical assessment of urgency) |                    | Total      |
|---|---------------|---|--------------------|------------|
|   |               | ≤6 months<br>(+ve)                                    | 7+ months<br>(-ve) |            |
| <b>Test result<br/>(based on predictor variables)</b> | ≤6 months +ve | 55  | 31 (FP)            | 86         |
|   | 7+ months -ve | 3 (FN)  | 11                 | 14         |
|   | <b>Total</b>  | <b>58</b>   | <b>42</b>          | <b>100</b> |

FP = false positive, FN = false negative

Similar calculations can be made for the other cut-off values (see Appendix B1).

### General model 2

Sensitivity, specificity, positive predictive values (PV+) and negative predictive values (PV-) calculated for general model 2 at varying cut-off values are presented in Table 41.

**Table 41: Sensitivity, specificity and predictive values for general model 2**

| Cut-off | Sensitivity | Specificity | PV+  | PV-  |
|---------|-------------|-------------|------|------|
| 0.1     | 1.00        | 0.03        | 0.40 | 0.93 |
| 0.2     | 0.92        | 0.32        | 0.47 | 0.86 |
| 0.3     | 0.78        | 0.58        | 0.55 | 0.80 |
| 0.4     | 0.63        | 0.74        | 0.61 | 0.76 |
| 0.5     | 0.50        | 0.85        | 0.68 | 0.73 |
| 0.6     | 0.40        | 0.92        | 0.76 | 0.70 |
| 0.7     | 0.27        | 0.96        | 0.82 | 0.67 |
| 0.8     | 0.16        | 0.99        | 0.88 | 0.65 |
| 0.9     | 0.05        | 1.00        | 0.92 | 0.62 |

Suppose, for example, a cut-off value of 0.5 is chosen. The test is 50% sensitive, meaning that 50% of urgent patients test positive and 50% are potentially misclassified (i.e. 50% of urgent people will be missed). Specificity for the test is 85%, meaning that 85% of non-urgent patients test negative (i.e. 15% of non-urgent patients will be

misclassified as urgent). If the test is positive, the probability of being urgent is 68%, but there is a 32% chance that the patient is not urgent. If the test is negative, the probability of being urgent is 27%, which indicates a 73% chance that the patient is not urgent.

*Example interpretation of general model 2*

Suppose there are 100 patients presenting for general dental care. According to the assessing dentist, approximately 40% require care within 3 months (i.e. 14.3% require care within 1 month and 25.5% require care in 1–3 months) and the remaining 60% are considered able to wait 4 or more months for dental care (i.e. 18.6% are classified as requiring care in 4–6 months and 60.2% are considered able to wait 7+ months for treatment) (see Table 29).

The way in which general model 2 classifies these 100 patients into the two treatment urgency categories, namely  $\leq 3$  months or 4+ months, depends upon the cut-off value selected. To illustrate how the model classifies these patients, suppose a cut-off value of 0.5 is used.

**Decision 1: cut-off = 0.5**

| Cut-off | Sensitivity | Specificity | PV+  | PV-  |
|---------|-------------|-------------|------|------|
| 0.5     | 0.50        | 0.85        | 0.68 | 0.73 |

Of those 40 patients actually requiring care within 3 months, 20 (50%) will be correctly identified as more urgent and will therefore be seen within 3 months, but 20 patients will be misclassified and receive care in 4 or more months time (i.e. 20 patients end up with false negative results).

Of the 60 patients who are considered able to wait 4 or more months for treatment, 51 (85%) without urgent need will actually test negative but 9 (15%) will be misclassified (i.e. 9 patients end up with false positive results) and receive care within 3 months.

These results are summarised in Table 42.

**Table 42: Example using general model 2 with cut-off = 0.5 to assign priority to 100 patients presenting for general dental care**

|   |                     | Clinician urgency<br>(clinical assessment of urgency) |                    | Total      |
|---|---------------------|---|--------------------|------------|
|   |                     | $\leq 3$ months<br>(+ve)                              | 4+ months<br>(-ve) |            |
| <b>Test result<br/>(based on predictor variables)</b> | $\leq 3$ months +ve | 20  | 9 (FP)             | 29         |
|   | 4+ months -ve       | 20 (FN)   | 51                 | 71         |
|   | <b>Total</b>        | <b>40</b>   | <b>60</b>          | <b>100</b> |

FP = false positive, FN = false negative

Similar calculations can be made for the other cut-off values (see Appendix B1).