

Impact of the national program More Smiles for Chile on women's quality of life

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More Smiles for Chile (MSCH) is a national program that helps women to access comprehensive dental care. **Objective:** To assess the changes in oral health related quality of life (OHRQoL) of women attending the MSCH program. **Methods:** Uncontrolled cohort study including all women registered in the National Health Fund (FONASA), who were at least 20 years old and received dental treatment in the MSCH program during 2016 or 2017 and completed OHIP-7 pre and post treatment. The median was used to describe central tendency and interquartile range to evaluate dispersion. **Results:** The study included 11782 women in 2016 and 16533 in 2017. The median OHIP-7 scores pre and post treatment were 8 and 6 respectively. Reductions were significant ($p < 0.001$) for the total score and OHIP-7 dimensions, especially physical pain, physiological discomfort and psychological disability. **Conclusion:** The OHRQoL of women improved after treatment in the Chilean MSCH program.

Keywords: Oral Health Related Quality of Life, Chile, OHIP-7, More Smiles for Chile program

Introduction

Oral diseases are the most common chronic conditions worldwide, posing a significant public health problem in terms of their high prevalence, individual and social impact, and rehabilitation costs (Kassebaum *et al.*, 2017). About half of the world's population is estimated to experience a disability because of oral conditions (Kassebaum *et al.*, 2017) and approximately 3.5 trillion people have untreated tooth decay, severe periodontitis or edentulism (Dye, 2017). The progression of cumulative and chronic diseases such as untreated tooth decay and severe periodontitis leads to tooth loss (Elani *et al.*, 2017), which is the main cause of years lost due to disability (DALYs) related to oral conditions (Kassebaum *et al.*, 2017). In Chile, the last National Health Survey (NHS 2016-2017) showed that the prevalence of cavitated caries in individuals aged 15 years old and above was 58.4% in men and 50.8% in women (54.6% overall) (Ministry of Health of Chile, 2018). Overall, only 73% had at least twenty permanent teeth, 77.1% in men and 69.0% in women (Ministry of Health of Chile, 2018).

Globally, the age-standardized prevalence and incidence of tooth loss is higher in women than in men, with the gender gap decreasing over time (Kassebaum *et al.*, 2017). In Chilean women, the burden of oral disease is higher when considering all age groups. This difference is especially significant in those aged 45-59 years where edentulism is the third largest cause of DALYs in women, with a burden 2.8 times higher than in men (Ministry of Health of Chile, 2008). The prevalence of total edentulism was 5%, but 7.1% and 2.8% in women and men respectively (Ministry of Health of Chile, 2018).

The World Health Organization (WHO) defines quality of life as an individual's perception of their position in life in the context of the culture and value systems in which they live and to their goals, expectations, standards and concerns (WHO, 1995). The concept of quality of life may be used for a variety of purposes such as measuring and analysing the needs of different groups of individuals, improving the effective communication between professionals and patients, and also assessing the results of public health programs; therefore, it serves as a useful tool for strategic resource management and public policy formulation (Bennadi and Reddy, 2013).

Oral health, like general health, impacts on the quality of life. The possible mechanisms underlying this relationship are complex, multifaceted, and heavily influenced by personal beliefs and subjective values (Wilson and Cleary, 1995). To measure oral health-related quality of life (OHRQoL), different tools could be used including multiple item questionnaires that vary in terms of number of questions or areas investigated (Bennadi and Reddy, 2013).

The Oral Health Impact Profile (OHIP-49) is the best-known instrument to assess OHRQoL (Slade and Spencer, 1994), being a comprehensive self-reported measurement of dysfunction, discomfort and disability related to oral health. Based on Locker's (1988) conceptual model, this questionnaire has satisfactory psychometric properties and is sensitive to the impact of prosthetic rehabilitations in OHRQoL (Montero *et al.*, 2013). A very short version of the OHIP (OHIP-7) has been validated in Chilean adults, obtaining a 0.93 Cronbach alpha, which indicates that the individual items measure the same construct as the whole. It consists of seven items and is especially useful in circumstances where time and resources are limited (Leon *et al.*, 2017).

The Chilean health system is mixed. Public health insurance covers about 80% of the population through a national health fund (FONASA), with care being mainly provided by professionals within the public National Health Service System. In parallel, the private health subsystem and a separate health system within the armed forces completes the coverage offered to nationals. Fewer than 5% of the Chilean population is not covered by any health insurance system (Hirmas-Adaury *et al.*, 2019). The program “More Smiles for Chile” (MSCH) aimed to improve the oral health of women aged over 20 years who were registered in FONASA (Ministry of Health of Chile, 2016). Since 2005 MSCH has completed treatment on 100,000 women per year, focusing on the most vulnerable groups, who also have the highest burden of caries, periodontitis and edentulism. MSCH is also implemented in private clinics, publicly funded, in areas where the public health system cannot guarantee the availability of care. This program helps women access comprehensive dental care, including prevention, conventional periodontal treatments, dental fillings, root canal treatments, dental extractions, and removable dentures. Annually, at least 70% of the women treated within MSCH receive removable dentures. The MSCH patients complete OHIP-7 surveys before dental treatment (Ministry of Health of Chile, 2016). Although the national coverage of this program is known, no evaluation of its impact on quality of life has been carried out. Therefore, this study aimed to assess the changes in OHRQoL in women attending the MSCH program associated with receiving dental treatment.

Methods

Participants

The study included the entire population of women registered in the Chilean National Health Fund (FONASA), who were at least 20 years old and had received an OHIP-7 survey before and after dental treatment in the MSCH program during May to December of 2016 or 2017. The participants were treated by a general dentist, either in a primary attention centre (public health system) or an external clinic (private health system). In both situations, the OHIP-7 was administered in digital format through the MINSAL’s website ODONTOAPS, in which every dentist of the MSCH program is registered. The database was obtained from this platform afterwards. The Ethics Committee of the Faculty of Medicine of the Pontifical Catholic University of Chile reviewed and approved this study under the protocol (ID 191127003). Informed consent was part of the MSCH program, and it was accepted and signed by all individuals.

The OHIP-7 survey is a self-report tool with seven dimensions (Figure 1). The perceived impact of oral health problems is measured on five-point Likert scales scored 0-4. A total OHIP-7 score is calculated as the sum of the item codes, with a maximum possible of 28, which indicates the worst quality of life (Leon *et al.*, 2017) (Figure 1). The pre-treatment OHIP-7 was administered at the first clinical session and the post treatment data were collected one to three months after dental discharge.

The dependent variable was post treatment OHIP-7. We measured age as a categorical variable with four levels of 15-24, 25-44, 45-64, 65 years or above, and geographic zone in four categories of North, Middle, South and the Metropolitan Region of Chile. The median and interquartile range were used to describe OHIP-7 scores. The Wilcoxon signed-rank test was used to compare groups, with a level of significance of 0.05.

We calculated the proportion of women whose OHRQoL improved after treatment, classified as positive if the post treatment OHIP-7 score was equal to or less than pretreatment score. The internal consistency of OHIP-7 was evaluated using Cronbach’s alpha (Bland and Altman, 1997). All analyses were performed by using Statistical Package for the Social Sciences (SPSS) version 24.0 (Mac OS X) (SPSS Inc., Chicago IL, USA).

Results

This study included 11782 women in 2016 and 16533 in 2017, who attended the MSCH program. We excluded women who had not completed OHIP-7 post treatment (45 and 109 in 2016 and 2017 respectively). Thirty-four per cent of the women attended a private clinic in 2016 and 30% in 2017. Cronbach’s alpha exceeded 0.8 in both years, which indicated good internal consistency.

Median total OHIP-7 scores pre and post treatment were 8 points and 6 respectively (Table 1). Significant reductions ($p < 0.001$) were found for the total score and each of the OHIP-7 dimensions. Reductions were greatest for physical pain (2 OHIP-7 points), physiological discomfort (2 points) and psychological disability (1 point).

Pre-treatment OHIP-7 scores were highest in the group aged 45-64 years (median 9), closely followed by the age group 65 years or above (Table 2). The reductions of the total OHIP-7 scores were significant in all age groups. The OHRQoL of more women in the groups aged 15-24, 25-44 and 65 years or above improved in 2016. Conversely, more of the group aged 65 years improved in 2017.

Table 3 summarizes the pre and post treatment scores by geographic zone. In 2016 and 2017, all zones presented a significant reduction ($p < 0.001$) in the median for pre-treatment and post-treatment. In 2016, the highest median pre-treatment (10 points) was in the Metropolitan Region; however, it decreased 4 points afterwards. In 2017, the North, Middle and Metropolitan Regions had the highest medians pre-treatment. The Middle and Metropolitan Regions experienced the highest reductions post-treatment (3 points). These total score reductions were all significant ($p < 0.001$).

Discussion

These results reveal improved OHRQoL in women using the MSCH program in 2016 and 2017. A possible reason for these findings is that the MSCH program included removable dentures, and in a previous study (Ellis *et al.*, 2007) prosthetic interventions improved OHRQoL. However, we could not infer from the design nature of our study that the results are specifically attributed to this cause.

| Dimension | Question | Five-point ordinal scale |
|--------------------------|---|---|
| Functional limitation | Do you feel that your digestion has ever worsened due to problems with your teeth, mouth or prosthesis? | 0 = never 1= hardly ever 2= occasionally 3= fairly often 4= very often |
| Physical pain | Have you ever suffered from sensitive teeth, for example, due to cold food or liquids? | |
| Psychological discomfort | Have dental problems ever made you feel totally unhappy? | |
| Physical disability | Have people misunderstood some of your words due to problems with your teeth, mouth, or prosthesis? | |
| Psychological disability | Have you ever had your sleep interrupted by problems with your teeth, mouth, or prosthesis? | |
| Social disability | Have you ever had difficulties doing your usual work due to problems with your teeth, mouth, or prosthesis? | |
| Handicap | Have you ever been totally unable to function due to problems with your teeth, mouth, or prosthesis? | |

Figure 1. Dimensions and questions of the Spanish version of the Oral Health Impact Profile (OHIP-7) questionnaire conducted in the MSCH program. Chile, 2016-2017

Pre-treatment impacts were greatest for physical pain, psychological discomfort, and psychological disability, as was found by Silva *et al.* (2019). The effect of psychological discomfort and psychological disability dimensions on OHRQoL has been explained by feelings of humiliation, shame and resignation associated with tooth loss (Silva *et al.*, 2019). Considering that adult Chilean women have lost an average of 11 teeth (Ministry of Health of Chile, 2018), the MSCH participants have a high risk of edentulism. Thus, a program including tooth replacement may reduce the impacts on these dimensions with subsequent impact on quality of life (Montero *et al.*, 2013).

The highest score pre-treatment scores were in women aged 45-64 years and 65 years and above. These findings correlate with self-ratings of oral health in the 2016-2017 National Health Survey (Ministry of Health of Chile, 2018), where 19% of the population aged 45-64 years and 22.6% of those aged above 65 years identified their oral health as “very bad”. However, the scores for both groups improved after treatment, yielding global values under the cut-off point for negative impact, which was set at a final score of 7 points for the Chilean validated OHIP-7 (Leon *et al.*, 2017). Women aged 65 and above had better OHRQoL than those aged 45-64 years. A previous study showed this paradoxical correlation (Slade and Sanders, 2011). Some reports have demonstrated that persons think that health suffers a normal decline over time; hence oral problems are considered to be “acceptable” (Locker and Gibson, 2005).

One potential use of OHRQoL is to identify priority groups to receive dental treatment (Sischo and Broder, 2011). We determined that the beneficiaries who received dental treatment had high levels of need, based on their OHRQoL. The data suggest that the MSCH program improved the OHRQoL of adult women, within a context where Chilean oral health policies are focused on individuals under 20 years. There remain opportunities for improvement, by extending the MSCH program to cover women aged 45 years and above, who report greater levels of impact, and hence need according to these data.

This study evaluated a national oral health program using OHRQoL, understanding that this can only be assessed by patients themselves (Black, 2013). The OHIP-7 is an easy applicable instrument to measure the possible effect of dental rehabilitation on quality of life (Kingsley and Patel, 2017). We have successfully used a validated generic OHRQoL instrument, but a more precise evaluation of dental programs like MSCH might be obtained with condition-specific measures. Future research, including patient related outcome measures (PROMs) or qualitative methods may capture more non-clinical factors. Moreover, since PROMs capture patient’s perspectives on outcomes, they have been seen for some time as having a distinctive potential to transform service evaluation (Elwood, 1988). In addition to PROMs, a recent US study indicated that the quality-adjusted life expectancy related to dental health was the third or fourth major cause of the burden of disease in the population. Thus, oral conditions have a substantial

Table 1. Total OHIP-7 and dimension scores in 2016 (n = 11782) and 2017 (n = 16533)

| | <i>Pre Treatment Median (interquartile range)</i> | <i>Post Treatment Median (interquartile range)</i> | <i>Proportion improving (%)</i> |
|--------------------------|---|--|-------------------------------------|
| 2016 | | | |
| Total OHIP-7 | 8 (9) | 2 (7)* | 91 |
| Functional Limitation | 0 (2) | 0 (1)* | 94 |
| Physical Pain | 2 (2) | 1 (2)* | 93 |
| Psychological Discomfort | 2 (3) | 0 (1)* | 94 |
| Physical Disability | 0 (2) | 0 (1)* | 92 |
| Psychological Disability | 1 (2) | 0 (1)* | 94 |
| Social Disability | 0 (2) | 0 (1)* | 95 |
| Disabled Person | 0 (2) | 0 (0)* | 95 |
| 2017 | | | |
| Total OHIP-7 | 8 (11) | 2 (6)* | 91 |
| Functional Limitation | 0 (2) | 0 (1)* | 95 |
| Physical Pain | 2 (2) | 1 (2)* | 93 |
| Psychological Discomfort | 2 (3) | 0 (1)* | 94 |
| Physical Disability | 0 (2) | 0 (1)* | 92 |
| Psychological Disability | 1 (2) | 0 (1)* | 94 |
| Social Disability | 0 (2) | 0 (0)* | 94 |
| Disabled Person | 0 (2) | 0 (0)* | 95 |

* $P < 0.001$, Wilcoxon signed rank test.**Table 2.** OHIP-7 total scores by year and age group.

| | <i>N</i> | <i>Pre Treatment Median (interquartile range)</i> | <i>Post Treatment Median (interquartile range)</i> | <i>Proportion improving (%)</i> |
|--------------------|----------|---|--|-------------------------------------|
| 2016 | | | | |
| 15-24 years | 629 | 4 (6) | 1 (4)* | 96 |
| 25-44 years | 4421 | 7 (9) | 2 (6)* | 92 |
| 45-64 years | 5256 | 9 (9) | 3 (7)* | 91 |
| 65 years and above | 1476 | 8 (10) | 2 (6)* | 92 |
| 2017 | | | | |
| 15-24 years | 870 | 4 (6) | 2 (4)* | 89 |
| 25-44 years | 5527 | 6 (9) | 2 (5)* | 89 |
| 45-64 years | 7496 | 9 (11) | 2 (7)* | 89 |
| 65 years and above | 2640 | 8 (11) | 2 (6)* | 91 |

* $P < 0.001$, Wilcoxon signed rank test.**Table 3.** OHIP-7 total scores by year and geographic zone.

| | <i>N</i> | <i>Pre Treatment Median (interquartile range)</i> | <i>Post Treatment Median (interquartile range)</i> | <i>Proportion improving (%)</i> |
|--------------|----------|---|--|-------------------------------------|
| 2016 | | | | |
| North | 706 | 7 (8) | 4 (5)* | 93 |
| Middle | 4120 | 8 (10) | 3 (6)* | 90 |
| South | 6105 | 7 (9) | 2 (6)* | 94 |
| Metropolitan | 851 | 10 (10) | 4 (8)* | 84 |
| 2017 | | | | |
| North | 1016 | 8 (12) | 4 (8)* | 89 |
| Middle | 6860 | 8 (9) | 3 (5)* | 90 |
| South | 6638 | 7 (10) | 2 (5)* | 93 |
| Metropolitan | 2019 | 8 (10) | 3 (6)* | 87 |

* $P < 0.001$, Wilcoxon signed rank test.

effect on the quality of life and should be considered in public policies (Matsuyama *et al.*, 2019).

A strength of this study was the design, which allowed evaluation of the effect the intervention over time; in this case, comprehensive treatment received by patients of the MSCH program (Caruana *et al.*, 2015). Likewise, the large number of participants supports the external validity of the evaluation. One limitation is the exclusion of women who did not complete post treatment questionnaires. Greater use of the pre and post questionnaires is required nationally. General dentists should be encouraged to use the OHIP-7 questionnaire, in the MSCH training. Another limitation is the lack of monitoring of women under treatment over time, since this program does not include multiple postoperative follow up. Women discharged from the MSCH program are not eligible to re-enter it until three years later (Ministry of Health, 2016). An additional dental check-up for MSHC patients after their treatment may prove beneficial and would give the opportunity to determine OHRQoL in the long term for more comprehensive evaluation. In addition, without untreated controls we cannot be sure that dental treatment was the cause of the improved OHRQoL among participants. Also, collection of other sociodemographic data including educational level, social class, work, and health related behaviours would have allowed more detailed evaluation. Future studies should consider the effect of sociodemographic variables and other factors, such as social desirability and the roles of expectations and response shift.

Conclusions

The findings of this study suggest that dental treatments received in the More Smiles for Chile program improved the OHRQoL of women treated in 2016 and 2017.

References

- Bennadi, D. and Reddy, C.V. (2013): Oral health related quality of life. *Journal of the International Society for Preventive and Community Dentistry* **3**, 1–6.
- Black, N. (2013): Patient reported outcome measures could help transform healthcare. *British Medical Journal* **346**, f167.
- Bland, J.M. and Altman, D.G. (1997): Cronbach's alpha. *British Medical Journal* **314**, 572.
- Caruana, E.J., Roman, M., Hernández-Sánchez, J., Solli, P. (2015): Longitudinal studies. *Journal of Thoracic Disease* **7**, E537-40.
- Dye, B.A. (2017): The Global Burden of Oral Disease: Research and Public Health Significance. *Journal of Dental Research* **96**, 361-363.
- Elani, H. W., Harper, S., Thomson, W. M., Espinoza, I. L., Mejia, G. C., Ju, X., Jamieson, L. M., Kawachi, I. and Kaufman, J. S. (2017): Social inequalities in tooth loss: A multinational comparison. *Community Dentistry and Oral Epidemiology* **45**, 266–274.
- Ellis, J.S., Pelekis, N.D. and Thomason, J.M. (2007): Conventional rehabilitation of edentulous patients: the impact on oral health-related quality of life and patient satisfaction. *Journal of Prosthodontics* **16**, 37-42.
- Elwood, P. (1988): Shattuck lecture – outcomes management. A technology of patient experience. *New England Journal of Medicine* **318**, 1549–56.
- Hirmas-Adauy, M., Olea, A., Matute, I., Delgado, I., Aguilera, X., Poffald, L., González, C., Nájera, M., Gómez, M.I., Gallardo, L., Abusleme, M.T., Leppe, J., Mery, H., Recabarren, E., Massad, C. and Bustamante, H. (2019): Assistive Devices for Older Adults: A Longitudinal Study of Policy Effectiveness, Santiago, Chile, 2014-2016. *Medical Education Cooperation with Cuba Review* **21**, 46-53.
- Kassebaum, N.J., Bernabé, E., Dahiya, M., Bhandari, B., Murray, C.J. and Marcenes, W. (2014): Global Burden of Severe Tooth Loss: A Systematic Review and Meta-analysis. *Journal of Dental Research* **93**, 20S-28S.
- Kassebaum, N.J., Smith, A.G.C., Bernabé, E., Fleming, T.D., Reynolds, A.E., Vos, T., Murray, C.J.L. and Marcenes, W. (2017): Global, Regional, and National Prevalence, Incidence, and Disability-Adjusted Life Years for Oral Conditions for 195 Countries, 1990-2015: A Systematic Analysis for the Global Burden of Diseases, Injuries, and Risk Factors. *Journal of Dental Research* **96**, 380-387.
- Kingsley, C. and Patel, S. (2017): Patient-reported outcome measures and patient-reported experience measures. *British Journal of Anaesthesia Education* **17**, 137–144.
- León, S., Correa-Beltrán, G., De Marchi, R.J. and Giacaman, R.A. (2017): Ultra-short version of the oral health impact profile in elderly Chileans. *Geriatrics and Gerontology International* **17**, 277-285.
- Locker, D. (1988): Measuring oral health: a conceptual framework. *Community Dental Health* **5**, 3–18.
- Locker, D. and Gibson, B.J. (2005): Discrepancies between self-ratings of and satisfaction with oral health in two older adult populations. *Community Dentistry and Oral Epidemiology* **33**, 280–288.
- Matsuyama, Y., Tsakos, G., Listl, S., Aida, J. and Watt, R.G. (2019): Impact of Dental Diseases on Quality-Adjusted Life Expectancy in US Adults. *Journal of Dental Research* **98**, 510-516.
- Ministry of Health, Government of Chile. (2008): [Informe final estudio de carga de enfermedad y carga 355 atribuible]. Santiago: MINSAL. <http://www.cienciasdelasalud356udla.cl/portales/tp76246caadc23/uploadImg/File/Informe-final-carga-Enf-2007.pdf>
- Ministry of Health, Government of Chile. (2018): [Resultados I Encuesta Nacional de Salud de Chile, 2016-2017]. Santiago: MINSAL. https://www.minsal.cl/wp-content/uploads/2018/01/2-Resultados-ENS_MINSAL_31_01_2018.pdf
- Ministry of Health, Government of Chile. (2016): [Orientaciones Técnico Administrativas para la Ejecución del Programa Odontológico Integral] Santiago: MINSAL. <http://163.247.80.2/priged/2016/DATADEIS/Informacion/Informaci%C3%B3n%20Sanitaria/Indicadores/PRAPS/2016/Orientacion%20Tecnica%20Programa%20Odontol%C3%B3gico%20Integral%202016.pdf>
- Montero, J., Castillo-Oyagüe, R., Lynch, C.D., Albaladejo, A. and Castaño, A. (2013): Self-perceived changes in oral health-related quality of life after receiving different types of conventional prosthetic treatments: a cohort follow-up study. *Journal of Dentistry* **41**, 493-503.
- Silva, M., Batista, A., Nogueira, A. and Delano, F. (2019): Oral Health Impact Profile: need and use of dental prostheses among Northeast Brazilian independent-living elderly. *Ciência & Saúde Coletiva* **24**, 4305-4312.
- Sischo, L. and Broder, H.L. (2011): Oral health-related quality of life: what, why, how, and future implications. *Journal of Dental Research* **90**, 1264–1270.
- Slade, G.D. and Spencer, A.J. (1994): Development and evaluation of the Oral Health Impact Profile. *Community Dental Health* **11**, 3-11.
- Slade, G.D. and Sanders, A.E. (2011): The paradox of better subjective oral health in older age. *Journal of Dental Research* **90**, 1279–1285.
- The World Health Organization Quality of Life assessment (WHOQoL) (1995): position paper from the World Health Organization. *Social Science and Medicine* **41**, 1403-1409.
- Wilson, I.B. and Cleary, P.D. (1995): Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *Journal of the American Medical Association* **273**, 59-65.