

**ORAL HEALTH SEEKING BEHAVIOUR AND ORAL HEALTH  
PROGRAMME FOR QUECHUA INDIGENOUS PEOPLE OF  
CHALLHUAHUACHO-APURIMAC, PERU**

**Karina Romero Guadalupe  
Peru**

44<sup>th</sup> International Course in Health Development  
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KIT (ROYAL TROPICAL INSTITUTE)  
Development Policy & Practice/  
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CHALLHUAHUACHO-APURIMAC, PERU**

A thesis submitted in partial fulfillment of the requirement for the degree  
of Master of Public Health

By

Karina Romero Guadalupe

Peru

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## ABSTRACT

**Problem:** Quechua indigenous people of Challhuahuacho-Apurimac, Peru seem to have worse oral health (dental caries and periodontal diseases) and less access to dental care facilities than the general population in the country.

**Objectives:** To analyse the oral health seeking behavior of Quechua indigenous people. Moreover, an analysis of oral health programmes was carried out in other indigenous and rural communities.

**Methodology:** The Andersen's behavioural model which is modified by the International Collaborative study for oral health outcomes and by the author of this thesis is used. Each oral health programme is also analysed using the criteria to assess the quality of oral health strategies stipulated by WHO.

**Findings:** The oral health situation of indigenous people was indeed worse than the rest of non-indigenous people; influenced by personal practices (low utilisation of toothbrush, changes in their traditional diet and alcohol consumption) and by frequent use of informal dental care facilities. Factors determining their oral health seeking behaviour are: lack of potable water & sanitation, no fluoride exposure, lack of dental health policies & services, low educational level, gender, poor socio-economic situation and rural character. Finally, in other countries, it was very useful the criteria done by WHO to develop strategies to overcome the burden of dental diseases in vulnerable population which seem to be also applicable for an oral health programme in Challhuahuacho.

**Conclusions:** The bad oral health outcome of indigenous people in Challhuahuacho concludes the necessity to implement preventive and public health strategies that have successful impact in other countries to improve their oral health status.

**Recommendations:** Research study, public health interventions and emergency dental treatment are recommended. Moreover a list of activities was developed to be used for an oral health programme in the area.

**Key words:** Indigenous people, Quechua, Peru, oral health seeking behaviour, oral health programmes.

## **LIST OF ABBREVIATIONS**

ADA:	The American Dental Association
ADS:	The Alaska Dental Society
ANC:	Antenatal care
APAFA:	Parent's organization
ART:	Atraumatic restorative treatment
DHS:	Demographic and health survey
DISA:	Direction of health
DMFT:	Decayed, missing & filled in permanent teeth
dmft:	Decayed, missing & filled in primary teeth
DIRESA:	The regional health authority
ECLAC:	Economic commission for Latin America and the Caribbean
ESSALUD:	Social health insurance of Peru
FUNAI:	The National foundation for Indians in Brazil
GDP:	Gross domestic product
GRADE:	Analysis group for the development
ICS-II:	International collaborative study for oral health
INEI:	National institute of statistics and informatics Peru
MDGs:	Millennium development goals
MINSA:	Ministry of health Peru
NGOs:	Non-governmental organizations
PAHO:	Pan American health organization
SIS:	Integral health insurance of Peru
SWOT:	Strengths, weakness, opportunities & threats
WHO:	World health organization

## **INTRODUCTION**

Indigenous people in Peru have been historically displaced and marginalized group. They live in remote areas without access to proper health care services and education facilities. Even though Quechua indigenous people are the descendants of a rich culture and a powerful empire "The Incas", they are the most disadvantaged group with high a level of poverty, illiteracy and unemployment.

I have witness the poor conditions in which many indigenous people in a remote area of the highlands of Peru (Apurimac) are living. Their hardships are ignored and unknown by the rest of the country. I worked as a dentist with those indigenous communities organizing and being part of oral health care and education campaigns which was sponsored by social department of a mining company. In my work, I realized not only that they have many dental problems but also that there is a great need and demand of dental services. It is a necessity to implement preventive measures or programs to control their oral diseases.

Nowadays, the Pan American health organization (PAHO) is proposing the integration of indigenous perspective into the millennium development goals (MDGs) and national health policies because of the inequities in health that indigenous people are facing in comparison to the rest of the society. For that reason and due to oral health being an integral part of general health and a determinant for quality of life, the implementation of an oral health program for indigenous people in Peru will contribute to improvements in maternal, child and over all to indigenous people's health.

Therefore, the purpose of this thesis is to analyse the oral health seeking behaviour of indigenous people in Challhuahuacho-Apurimac and oral health programmes for the indigenous population around the world and in other communities with the similar background in terms of oral health in order to make recommendations for a sustainable oral health programme that can be used for the Quechua indigenous communities in Challhuahuacho- Apurimac Peru to improve their oral health status and to increase access to oral health services.



## **CHAPTER 1: BACKGROUND INFORMATION**

### **1.1 Country's general information**

#### **a) Geography and Demography:**

Peru is situated in South America and borders to Ecuador and Colombia (north), Chile (south), Brazil and Bolivia (east) and the Ocean Pacific (west). The country has a land area of 1,285,215 km<sup>2</sup>, distributed over three major geographic regions: the coast, the Andean highlands and the Amazon jungle <sup>1</sup>.

Peru has a population of 28 220 764 inhabitants according to the last DHS (demographic and health survey) conducted in 2007. It is politically divided into 25 departments and encompasses 194 provinces and 1,829 districts (see annex 1) <sup>2</sup>.

#### **b) Economy**

During the last ten years, Peru has experienced a continuous economic growth. In 2005, Peru was ranked as a middle income country as a result of the increase of its per capita gross domestic product (GDP) of U\$ 5,983 <sup>1</sup>. In 2007 the country achieved the highest GDP growth (8.9%) in its history because of the generalized increase of private and foreign investment (particularly mining and construction) and consumption <sup>3</sup>. However, the economic growth experienced by the country in the last years was not necessarily translated into poverty reduction because mining and other private companies, principals responsible of the increase in the GDP, created low demand for labor and just for skilled workers and it was not favorable for the poorest people. Therefore, poverty increased from 48.4% in 2000 to 53% in 2004 with an unequal distribution in rural and urban areas. The percentage of people living under poverty in rural areas was 69.3% and 37.1% of them lived in extreme poverty (2006). In the highlands and in the Amazon jungle of the country poverty was also higher: 63.4% and 56.6% respectively <sup>2</sup>. The monthly average national household income (2006) differed tremendously between coast and highlands population (U\$ 196.4 and U\$ 43.2 respectively) because of lack of jobs and opportunities in those areas.

Due to the increase in unemployment in the last years, 55% of the economically active population works in the informal sector without a steady income, access to social security and provisions for retirement <sup>1</sup>.

#### **c) Education**

The country registers a relative low percentage of illiteracy in the population older than 15 years which is 7.1% (according to the last DHS-2007) but with great differences between people living in rural (19.7%) and urban (3.7%) areas. Moreover, women are more illiterate than men (10.6% vs. 3.6%) <sup>2</sup>. Preschool (between 3 and 5 year-old children), primary (between 6 and 11 year-old children) and secondary school (between 12 and 16 year-

old children) attendance were 52.3%, 94.9% and 88.3% respectively. The average number of years of education were 9.1 years: 6.8 years in rural areas and 10.1 years in urban areas <sup>1, 2</sup>. In 2005 the public expenditure on education was just 2.6% of the country's GDP, causing low salaries, high level of discontent for school teachers and poor infrastructure in public schools <sup>4</sup>.

#### **d) Health system**

Peru's health system comprises of: a) the Ministry of health with decentralized public national institutions like ophthalmology, cancer, rehabilitation, pediatrics etc; b) ESSALUD (medical insurance and insurance for workplace risks and occupational health) which is a public insurance and is mandatory for salaried workers, leaving also complementary plans and insurance scheme open to the private sector (covering 17.4% of the total population); c) regional and local governments (provide public services); d) the health services of the armed forces and the police covering 5.9% of the total population; and e) the nonprofit and for profit private sector covering 0.6% of the total population <sup>1,2</sup>.

In 2001, the Comprehensive health insurance (SIS) was created by the Government to facilitate free access to basic health care for poor and extremely poor pregnant women, minors under 18 years and certain groups of adults living in extreme poverty <sup>1</sup>. In 2007, 37.9% of people living in rural areas and 12.3% of people living in urban areas possessed this medical insurance (SIS) but there is still 57.3% of the total population that is not affiliated to any health insurance <sup>2</sup>.

#### **e) Oral Health**

Dental caries is affecting 95% of the total population in Peru: 90.7% among students between 6 and 15 years old and among 65% of children less than 5 years of age <sup>5</sup>. According to WHO (World health organization), Peru has one of the highest levels of dental caries prevalence in Latin America which is measure by the DMFT (Decayed, missing & filled permanent teeth – see annex 3) index <sup>6</sup>. The mean DMFT score in the country was 5.7 in 2001 and it fluctuated between 8.3 in Ayacucho and 3.5 in Ancash. In children of 12 years of age the mean DMFT score was 3.9 <sup>1, 5</sup>. Moreover, periodontal diseases and malocclusions are also high affecting 85% and 80% respectively of the Peruvian population <sup>5</sup>.

The second highest reason for health consultation in all national health facilities in the MINSA (Ministry of Health) in 2006 were oral diseases (9%) <sup>5</sup>. Of the total number of dental visits, 20.6% were for tooth extractions and 18% were for fillings. Despite this high demand for dental treatment, only 16% of all health facilities of the MINSA provide dental services so people have to form long queues in hospitals or in the existing limited public health facilities that provide dental treatment or wait to be attended. This is partly due to the reluctance of the government to hire more dentists and the limited budget that the MINSA manages. In recent years the number of dentists decreases in all establishments of the MINSA (1681 in 2002 and

1607 in 2004) which is a huge problem for the population and for dentists due to the overload of work <sup>1</sup>. According to WHO, Peru has a shortage of dentists in the country (0.11 dentists/1000 inhabitants) and there are no dental hygienists in comparison with other developed countries like United States with 0.59 dentists/1000 inhabitants and more than 112 000 dental hygienists <sup>7</sup>. Moreover, the public expenditure on health in 2006 was only 1.1% of the national GDP <sup>4</sup> which is very low. Therefore, there is no money to hire more health professionals or to build health facilities in remote areas to increase access to health services for indigenous people. Subsequently, funds available for oral health are meagre.

## **1.2 Indigenous people**

### **a) Definition of indigenous people**

“Indigenous people are defined as the original inhabitants of an area who live in an Indigenous way and are accepted by the Indigenous community. Indigenous people could also be those who are successful in maintaining ancestral behaviors over specific territories with or without traditional lands” <sup>8</sup>. “They have a social and cultural identity distinct from the dominant society which makes them vulnerable to being disadvantaged in the development process” <sup>9</sup>.

### **b) Indigenous people in Latin America**

According to the PAHO (2005), there are between 45 and 48 million indigenous people living in Latin America and they speak roughly 400 different indigenous languages. There are some societal commonalities between indigenous people in Latin America which are: cultural (shared knowledge and identity), political (internal hierarchies and territorialism), spiritual (ideology, beliefs and religion) and ecological (use of natural resources, ecological cycles) <sup>8</sup>.

Indigenous people in Latin America are disadvantaged and marginalized groups in terms of illiteracy, higher levels of poverty, unemployment and lack of health facilities (40% of the indigenous population lack access to health services and 80% rely on traditional healers) than their non-indigenous counterparts <sup>10-13</sup>.

### **c) Indigenous people in Peru**

Peru had a population of 11 655 000 indigenous people in 2005 (47% of the total population) among which there are Quechua, Aymara, Ashaninka, Achuar, Matsigenka and other indigenous groups; representing the second largest country of Latin America and the Caribbean with indigenous people. Most of the indigenous people of Peru are poor (79%) and more than half are extremely poor. They are one and half times as likely to be poor as are non-indigenous people and almost three times as likely to be extremely poor <sup>8</sup>.

#### **d) Health situation of indigenous people**

Some studies suggest that indigenous people have higher rates of mortality and morbidity indicators than their non-indigenous counterparts<sup>8, 14</sup>. Child and maternal mortality rates are higher for indigenous people from Latin America, Asia and Africa than the general population. For example, in remote areas maternal mortality rates could be twice or three times as high as national averages. Moreover, some infectious diseases such as tuberculosis and some chronic diseases like diabetes and heart disease have a higher prevalence in indigenous people from wealthier countries than the rest of the people. Other problems like suicides, alcohol and drug uses are also common in indigenous communities from Canada, the USA, New Zealand and Australia<sup>14</sup>.

In Peru, indigenous people also have worse health indicators than the rest of the country for example: indigenous children in the Amazon of Peru (the Campa-Ashaninka) has an infant mortality rate of 99 per 1000 infants and the Machiguenga has a rate of 100 per 1000 which are 3-4 times higher than national averages. Maternal mortality is also higher for indigenous communities in Peru than the general population<sup>8</sup>.

These inequalities in health outcomes for indigenous people compared with majority populations is principally caused because indigenous people live in isolated or geographical remote areas where it is difficult to have access to health services.

### **1.3 Background information of Quechua indigenous people in Challhuahuacho-Apurimac**

#### **a) Location and demography**

Apurimac is a department of Peru with 439 520 inhabitants (DHS-2007) and it is divided in 5 provinces: Abancay, Aymares, Grau, Antabamba and Cotabambas<sup>2</sup>.

The province of Cotabambas has 6 districts: Tambobamba, Cotabambas, Coyllurqui, Haqira, Mara and Challhuahuacho (see annex 2). The district of Challhuahuacho is located at 3698 meters above the sea level and it has a population of 7058 (2008) inhabitants including 16 Quechua indigenous communities<sup>5</sup>. Fuerabamba and Huancuire are the indigenous communities with the largest number of people in the district. Fuerabamba has 833 inhabitants (169 families) distributed in 14 commune and Huancuire has 249 inhabitants (63 families) distributed in 5 commune<sup>15</sup>.

#### **b) Culture and language**

Quechua Indigenous communities of Challhuahuacho-Apurimac have their own traditional clothing, dance, food and celebrations. The "Yawar Fiesta" or "Toro Pucllay" is the most important party or celebration of their indigenous culture with some occident influence.

Even though they celebrate some catholic events like "Virgin of Rosario" in October, they still venerate the mountains, sources of water and the land or "Pachamama" which are considered as protective spirits or Gods and are called "apus" <sup>16</sup>.

The base of their social organization is called "ayllu" which means extend family (group of families related by blood) and leaders of each ayllu has great influence in the community at the moment to make decisions on it. These leaders can also be the President of the community, vice-president, secretary and other members of the Community Assembly which are elected by members of the community every 2 years <sup>15</sup>.

The local language is Quechua, an ancient Peruvian language that remains in use throughout the Andean region which is spoken by 71.5% of the population in the department of Apurimac <sup>2, 17, 18</sup>. Indigenous people of Challhuahuacho hardly know Spanish, the language of the general population in the country. Therefore, language can be a barrier for transmission of health information between indigenous people and health workers, if they do not come from the local area.

### **c) Economy and occupation**

Apurimac is one of the poorest regions of the country: 74.8% of its inhabitants are poor and 30.7% of them are extreme poor <sup>2, 19</sup>. At the same time, Cotabambas is the second poorest provinces of the country. In the indigenous communities of Fuerabamba and Huancuire, 91% of the population is poor and 84% of them live in extreme poverty. The monthly average income in these communities is U\$ 20.8 <sup>15</sup>.

Agriculture is the principal activity of indigenous communities in Challhuahuacho and the potato harvest is done by 97.5% of them. Other activities like breeding sheep, cows and other animals from the area (llama and alpaca); and commerce are practiced for indigenous people. Moreover, nowadays, some of them are being hired as temporary workers by the mining company in the area <sup>15</sup>.

### **d) Education**

Apurimac is the department with the highest number of illiterate people in the country (21.7%) with great differences between women (32.2%) and men (10.7%) <sup>2</sup>. Furthermore, the situation in the communities of Fuerabamba and Huancuire is worse: 33% and 43% of illiterate population respectively <sup>2, 15, 19</sup>. In general the indigenous people of Peru have low school attendance due to the language barrier and a few pre-schools and secondary schools in remote areas. Moreover, due to poverty some families prefer to have their children work in order to earn even a small amount of money that can contribute to their household income.

### **e) Infrastructure**

Indigenous communities in Challhuahuacho do not have access to potable water and water cloth sanitation. They collect water from rivers and rain. In Fuerabamba half of the families in the community have access to

electricity because of the proximity to the town of Challhuahuacho; while just 19% of total families in Huancuire have electricity in their houses.

The road infrastructure is poorly developed, only rough roads exist which are in bad conditions and are not maintained. There is no public transportation in the area and indigenous people have to walk long distances (1-4 hours) to go to different places: school, health center, etc <sup>15</sup>.

#### **f) Health situation and health services**

Apurimac has one of the highest mortality rates in the country (9.3/1000 inhabitants) and the infant mortality rate is 93/1000. The highest rate of morbidity is caused by respiratory infections (30% of cases), this is followed by dental and periodontal diseases (13% of cases). There is no information registered about dental and periodontal diseases as cause of morbidity in the district of Challhuahuacho as there are no dentists employed there <sup>19</sup>.

The province of Cotabambas has 23 health facilities which are part of the direction of health (DISA) Apurimac I of the MINSA. There are 4 public health centers and 19 public post health centers providing prevention, promotion and recuperation health activities, particularly for women and children. Two of the 19 post health centers are located in Challhuahuacho, one in the capital of the district and the other in the community of Zambulla covering 16 dispersed indigenous communities. There are only 2 general physicians, 2 nurses, 2 obstetrics and 4 technicians distributed in the 2 post health centers. Therefore, there is insufficient number of health professionals in the area: 0.3 physicians/10000 inhabitants, 0.3 nurses/10000 inhabitants and 1.6 technicians/10000 inhabitants <sup>5, 15</sup>.

## **CHAPTER 2: STATEMENT OF THE PROBLEM, OBJECTIVES AND METHODOLOGY**

### **2.1 Description of the problem**

Oral health diseases qualify as a major public health problem due to their high prevalence and incidence in all regions of the world, especially in developing countries like Peru. In Peru, oral health diseases constitute the third cause of morbidity in indigenous people of the Amazon and the second cause of morbidity in the department of Apurimac <sup>19</sup>. In addition, Quechua indigenous people of Apurimac (children and adults) seem to have high prevalence of dental caries according to some information gathered by Dr. Mautsch (in children)<sup>20</sup> and by the author (in adults) (see annex 4). It can be seen that a great difference of DMFT score exists between adults from the country as a whole (5.7) and that from indigenous people of Challhuahuacho-Apurimac (14.3).

Indigenous people are at higher risk to be affected by oral diseases than non-indigenous people because of social-cultural factors and the lack of accessibility to dental services due to the geographic isolation where they live and some barriers like: unaffordability to pay for services, facilities or transportation, language, culture and beliefs and the fear to attend oral health facilities due to the unfriendly and insensitive staff <sup>21-25</sup>. Moreover, the contact of indigenous people with their non-indigenous counterparts or with the western (or urban) lifestyle could influence their dietary patterns making indigenous people consume industrialized foodstuffs, high in refined carbohydrates and saturated fat and consequently, have a diet with low nutritional quality that is associated with obesity, diabetes and high prevalence of dental caries <sup>26</sup>.

Dental caries and periodontal diseases are the most common oral health problems and they have a high impact on individuals and communities because of pain, suffering and impairment of function that they cause reducing quality of life. Moreover, oral infection can kill people if it is not treated adequately because of the spread of the infection throughout the body. Maternal oral infection may play a role in the development of low birth weight as has been demonstrated <sup>6, 27</sup>.

Oral health diseases are related to socio-cultural determinants such as low education level, lack of culture in supporting oral health and environmental factors like inappropriate exposure to fluorides. In Peru there is a national salt fluoridation programme as a measure to prevent dental caries but the distribution and commercialization are not equal in all part of the regions. On the coast, more than 80% of the urban population consumes iodized and fluoridated salt while only 60% of the highlands and the jungle population have access <sup>1</sup>. Indigenous communities are not beneficiaries of this programme. In addition, there are some lifestyle behaviors that have

an impact on oral health such as: hygiene practices, sugar consumption, tobacco use, excessive alcohol consumption and lack of oral health services and oral health education <sup>6</sup>.

Oral health should be considered as an important part of general health. In order to achieve three of the Millennium Development Goals (MDGs) which are improving maternal and child health and combating HIV/AIDS, one of the strategies proposed by PAHO is to improve the general health by improving oral health in vulnerable groups (children, pregnant women and also indigenous people) <sup>13, 27</sup>.

Despite the fact that common dental diseases are preventable, not all communities' members are informed or receive appropriate oral health-promoting measures, especially vulnerable groups like indigenous people because of geographical barriers and lack of awareness <sup>6</sup>. Therefore, it is mandatory to make an analysis of the oral health seeking behaviour of indigenous people in these communities and to analyse what has been done in other oral health programmes for indigenous and rural communities to formulate recommendations for an oral health programme that is suitable for indigenous people of Challhuahuacho-Apurimac, Peru.

### **3.1 Objectives of the thesis**

#### **3.2.1 Overall objectives**

- To analyse the oral health seeking behaviour of Quechua indigenous people in Challhuahuacho-Apurimac, Peru and other oral health programmes in indigenous communities and in communities with the same background in terms of oral health in order to make recommendations for the design of an oral health programme to improve the oral health status and to increase access to oral health services of those Quechua indigenous people.

#### **3.2.2 Specific objectives**

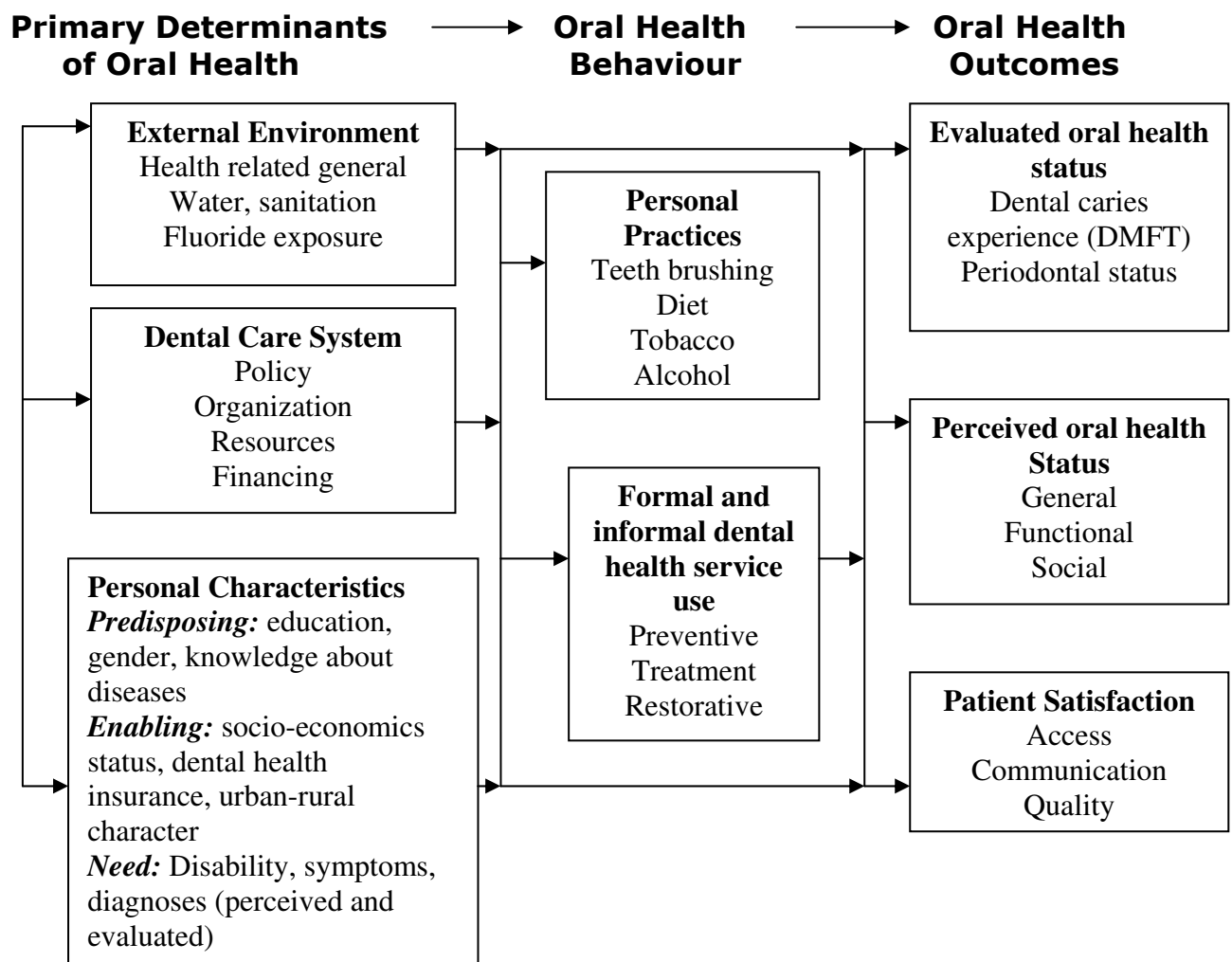
- To analyse the oral health status of indigenous people in different countries.
- To analyse the oral health seeking behaviour of Quechua indigenous people in Challhuahuacho-Apurimac.
- To analyse oral health programmes in indigenous people or in rural communities without or limited access to dental services.
- To formulate recommendations in the design of an oral health programme for Quechua indigenous communities in Challhuahuacho – Apurimac, Peru.



### 3.2 Methodology

- a. Literature review of the oral health situation of indigenous people in different countries around the world.
- b. The Andersen's behavioural model of health services utilisation <sup>28</sup> modified by the International Collaborative study for oral health outcomes (ICS-II, USA) <sup>29</sup> and by the author of this thesis will be used to analyse the oral health seeking behavior of indigenous people in Challhuahuacho-Apurimac, Peru. The information will be gathered through literature review of studies in the area by the social department of a mining company. The data collected by the author of this thesis is also used in this writing process.

#### Oral health seeking behaviour model



Source: Andersen model, 1995 <sup>28</sup>, modified by the International Collaborative study of oral health outcomes (ICS-II, USA), 1997 <sup>29</sup> and by the author of this thesis.

The framework posits that the primary determinants of health which are divided in characteristics of the external environment, the dental care system and the personal characteristics of the populations influence oral health behaviours (oral health practices and dental services). At the same time, oral health behaviours are conceptualized as intermediate dependent variables, that would influence oral health outcomes (evaluated, self-perceived and patient satisfaction) <sup>28, 29</sup>. The framework of Andersen modified by the ICS-II is also modified by the author who does not include the effects of race-ethnicity and age cohort in the framework as factors influencing oral health because the study is not comparing ethnic groups and age cohorts; it is just focusing on Quechua indigenous people of Apurimac-Peru.

- c. Literature review of other oral health programmes amongst indigenous people and population that have similar dental problems experience as indigenous people of Challhuahuacho-Apurimac, Peru has.
- d. SWOT analysis (strengths, weakness, opportunities and threats) of different oral health programmes in indigenous and in rural communities (see annex 5). The criteria to assess the quality of oral health strategies stipulated by WHO in 2005<sup>30</sup> (see annex 6) based on the WHO guidance of the development and evaluation of public health policy (Copenhagen, 1998)<sup>31</sup> will be used to analyse each oral health programme in the SWOT. The analysis is done using the following set of criteria:
  - **Empowering:**
  - **Participatory**
  - **Holistic**
  - **Intersectoral**
  - **Equity**
  - **Evidence base**
  - **Sustainable**
  - **Multi-strategy**
  - **Evaluation**
- e. Finally, using the results of the previous analysis, a set of recommendations will be designed for an oral health programme in indigenous communities from Challhuahuacho-Apurimac-Peru.

**Search strategy:** Web-based academic databases used were: Pub Med, Picarta, Medline, Google Scholar and Cochrane library. Moreover, The Lancet series of indigenous people, Google, PAHO and WHO site were used. Important data about the country and the local area was obtained looking at the web-side of the MINSA (Ministry of health Peru) and INEI (National Institute of Statistics and Information). Some scientific literature was also gathered through Scielo and KIT library catalogue.

**Search terms used:** Indigenous people, native people, Quechua communities, oral health, oral health programme, health seeking behaviour, community participation, DMFT, dental caries, dental diseases, health situation, rural oral health care, health promotion, highlands, Peru, Apurimac, Challhuahuacho, PAHO, Latin America.

### **3.3 Limitations of the study**

The Andersen's behavioural model modified by the ICS-II and by the author that will be used to analyse the oral health seeking behaviour of indigenous people in Challhuahuacho-Apurimac can not be described in the totality because of the lack of information in the literature about periodontal status, perceived health status and some personal characteristics of indigenous people in the area. Even though there is no formal information in some aspects of patient satisfaction or personal practices, the author will describe these parts based on her own observation in the area. Moreover, the data presented by the author about oral hygiene practices and dental caries experience (DMFT) in these communities has some bias such as: there is a biased sample of the population examined because they were patients who attended to an oral health service; therefore it is a "sick" sample and not a true sample of the population. In addition, all the information collected about DMFT and an oral hygiene practice were in a group of people between 18 and 70 years and there was no categorization in age groups creating a bias because caries is age related. This is why the data collected by the author will be used as a reference of the oral health situation of these communities due to the fact that no oral health study was done before in the area.

Therefore, this study is a purely literature review combined with some information gathered by the author in the zone.

In the next part, some specific objectives of the thesis will be described starting with the description of oral health situation of indigenous people around the world followed by the analysis of the oral health seeking behaviour of Quechua indigenous people of Challhuahuacho-Apurimac, Peru which is included in chapter 3; and finally the description and analysis of oral health programmes in indigenous people and in communities with the similar oral health problems to indigenous people is done in chapter 4.

## **CHAPTER 3: SITUATION ANALYSIS OF THE ORAL HEALTH OF INDIGENOUS PEOPLE.**

This chapter will start with the description of the oral health situation of indigenous people around the world:

### **3.1 Oral health of indigenous people**

In Australia, recent evidence (2006) suggests that indigenous children have on average twice as much (and in some communities, up to five times as much) tooth decay as their non-indigenous counterparts<sup>22, 32, 33</sup>. In the Northern territory of Australia indigenous children of 5 years of age have almost four times the dmft (decayed, missing & filled primary teeth) than the non-indigenous children and those of 10 years of age have almost five times the DMFT of non-indigenous children<sup>34</sup>. Furthermore, some studies found that indigenous adult people in Australia have worse periodontal disease levels than the non-indigenous population<sup>23</sup>.

In Brazil (2001), a study made in Indians of the upper Xingu concluded that they have high levels of dental caries in all age groups and a high ratio of missing teeth for persons above 20 years of age. The average DMFT for 11 to 13 years of age children was 5.9<sup>24</sup>. Furthermore, another study made among the Xavante Indians in Pimentel-Mato Grosso found low frequency of fillings in permanent and deciduous teeth and the highest DMFT (19.6) was found in adults of 50 years and more<sup>35</sup>.

In Alaska (1999), studies found that native children and adolescents experience approximately 2.5 times dental caries than that seen in the general US population and children of 2-4 years of age have 5 times the US average of tooth decay rate. It is also reported that 60% of Alaska native children have severe early childhood caries (baby bottle tooth decay) and in general 68% of Alaska native children have untreated dental caries causing repeated absences from school because of dental pain. Furthermore, Alaska native adults (one third of them) have severe periodontal disease with higher rates of it than the general population<sup>21, 25</sup>.

In Colombia (2001), a study on indigenous adults of the Amazon rain forest (living on the bank of the Cotuhe and the Igaraparana rivers) found a high prevalence of dental caries (mean number of decayed teeth was 6.2) and periodontal disease (low severity) which was mainly associated with gingival recession in the presence of heavy deposits of calculus<sup>36</sup>.

In Guatemala (2002), adolescents and adults Mayan Indian of rural Central America (San Juan La Laguna) reported having untreated oral diseases (dental caries and general gingivitis-gingival inflammation). Gingivitis was found in the majority of the cases and it was more extensive and severe than that seen in populations of developed countries. Moreover, a range of

periodontal disease levels was present (high tooth retention and supra and subgingival calculus deposits) and severity depended on age cohort <sup>37, 38</sup>.

In Ecuador (in the Amazon basin - 2008), a study concluded that the overall caries (prevalence of dental caries) was higher among indigenous than non-indigenous children between 6 and 12 years of age. The mean dmft in indigenous children of 6 years of age was 6.4 and the DMFT for 12-year-old indigenous children was 4.5; fillings were almost non-existent <sup>39</sup>.

In Chile (2002), a study in Mapuche indigenous children between 6 and 12 years of age found that 99% of 100 children examined had dental caries or at least history of having it. The average dmft score for the whole sample was 4.5 (70.5% of decayed teeth, 24.3% with indication of extraction and 5.1% of them filled) and the average DMFT score was 2.8 (86% of decayed teeth, 7% with indication of extraction and 7% of them filled) <sup>40</sup>.

In Peru (2005), in the province of Antabamba, Cotabambas and Grau (Apurimac), 842 indigenous children of 6, 9 and 12 years of age were examined by a group of dentists. It was found that 44.9% of children of 12 years of age did not have dental cavities but they presented white spots in 70% of their permanent teeth and in children of 6 years of age the dmft score was very high: 5.7 and in average 11 teeth affected by caries <sup>20</sup>. Moreover, the Ministry of health of Peru (MINSA) reported that in indigenous people of the Peruvian jungle (Amazon), the third cause of morbidity (in 2003) in all MINSA facilities were oral health diseases (11.4%) <sup>41</sup> which shows the great demand of dental services in those communities.

The next part will describe the oral health seeking behaviour of our target group (Quechua indigenous people).

## 3.2 Situation analysis of indigenous people of Challhuahuacho-Apurimac Peru related to oral health

### 3.2.1 Oral health outcomes

- **Evaluated oral health status:**

During 2006 and 2007 an oral health clinic was in operation in the community that was sponsored by a mining company. The author and 2 other dentists provided oral health treatments (fillings and extractions) for 3 months to the indigenous people that were between 18 and 70 years of age. All patients attending the community health clinic (757), representing 11.7% of the total population in the district of Challhuahuacho were examined (see annex 4 – table 1). The total mean DMFT score among all patients was 14.3. The mean of decayed teeth was 8.2 (57% of cavities that need to be filled), the mean of missing teeth was 5.3 (42% of teeth missing) and the mean of filled teeth was 0.8 (5% of teeth filled) (see annex 4 – table 4).

Even though periodontal diseases were not measured using a specific index, periodontitis and gingivitis were frequently diagnosed among adults' indigenous people.

In addition, according to a study made by Dr. Mautsch (2007) in children of the provinces of Grau, Cotabambas and Antabambas from the same department (Apurimac), the dmft score of children of 6 years of age was high (5.7)<sup>20</sup> which suggests the possibility to find the same results in indigenous children of Challhuahuacho.

The findings of DMFT score (14.3) in indigenous people of Challhuahuacho-Apurimac give us an idea that they have worse oral health indicators in comparison with people living in the rest of the country (general DMFT score of 5.7) and that they have also a great demand for dental treatments. This finding coincides with the cases of indigenous communities in Australia, Alaska, Brazil, Ecuador, Guatemala and Colombia<sup>22, 24, 25, 36, 37, 39</sup>.

- **Perceived oral health status**

**General:** According to a survey made by the social department of the mining company to the population from Fuerabamba and Huancuire, more than half of them manifested pain or any physical suffering during the last months. Problems in the respiratory and digestive system were the most common reported by the population but there is no information about oral health status or toothache reported by them<sup>16</sup>. However, it can be assumed that they have similar conditions as people from the whole department of Apurimac where oral diseases formed the second cause (12.6%) to assist any public health facility of MINSA in 2006 which is higher than national average (9%)<sup>19</sup>.

**Functional:** Indigenous People of Challhuahuacho (attended by the author and other dentists) with toothache, dental abscess and chipped or

broken tooth reported to have limitations in teeth functions as mastication, speech and esthetics.

**Social:** Some of these patients also reported missing or restricting activities at work, school or at home due to dental pain. Moreover, oral diseases can cause psychosocial impact but it was not claimed by them.

- **Patient satisfaction**

**Access to health services:** Information gathered by the social department of the mining company registered that in 2004, 82.8% of the population of the communities of Fuerabamba and Huancuire attended at least once to a public health service or a public health post (which provide primary health care to the population) when suffering a common illness and 13.9% did not attend any health facility. In the case of complicated illness, 77.3% of people from those communities went to a public health center or health post while 12.4% went to the hospital. Principal reasons not to attend any health facilities were: low economic situation (44.6%) and distance (34.6%)<sup>16</sup>.

In the district of Challhuahuacho, lack of affordability to pay for fees in the health service or for the transport therefore, families of the community of Fuerabamba have to walk 1.5 hours and families of the community of Huancuire have to walk 2 hours to reach one of the nearest health facilities<sup>15</sup>. In the case of access to dental treatment, members of the community have to travel for more than 2, 3 or 8 hours by car to see a dentist in the district of Cotabambas, Haquira, Tambobamba or the city of Cusco for more complicated treatment like endodontic (root canal treatment to save a tooth).

The lack of access to dental health services in Quechua indigenous people from Challhuahuacho is comparable with the cases of indigenous people from Australia, Brazil, Alaska, Guatemala, Colombia, Ecuador and Chile where there are also low incorporation and irregularity of dental care services programmed for them and the lack of access to professional dental care due to the geographic isolation<sup>21, 22, 24, 36, 37, 39, 40</sup>.

**Communication:** As mentioned before, language can be a barrier for transmission of health information between health providers and indigenous people in Challhuahuacho because not all health workers speak the local language which is Quechua. PAHO (2006) says that indigenous people or culturally different populations frequently do not understand explanations given by health providers because of the quick explanations about their disease, its mode of transmission, progression and treatment needed and health workers sometimes do not take the trouble to know if the information was well understood or not by patients. Moreover, when the patient is accompanied by a bilingual relative to translate the information given by the health worker, it is difficult to control the information transmitted<sup>10</sup>. Language barriers were

also found in indigenous people from Australia, Alaska and Brazil attending dental care facilities.

**Quality:** One survey made by the Social department of the mining company to the population of Challhuahuacho about health services utilization revealed that some reasons for not attending any health facility were bad attitude of health workers and lack of drugs in those facilities followed by complaints of the population for long waiting time that could be due to the insufficient number of health workers <sup>16</sup>. Moreover, health public services of Challhuahuacho lack dental equipment and dental X rays which are needed to provide a good oral health care to the population. In the nearest districts (Cotabambas, Haqira and Tambobamba) where people from Challhuahuacho can go for dental treatment, the situation is similar, dental equipment (dental unit and instrumental equipment) are old and not well maintained and there are no dental X rays needed to give good diagnosis. It can be added that the lack of dental materials in those health facilities like composite resin fillings which are recommended in anterior teeth, sealants and halogen lamps make dental health care delivery rather inadequate. The only material available for dental restoration is amalgam (traditional metal dental filling) and people do not have another alternative or choice.

### 3.2.2 Oral health behaviour

- **Personal Practices:**

**Tooth brushing:** According to the data collected by the author 757 indigenous adults of the communities of Challhuahuacho-Apurimac were interviewed about habits of tooth brushing and it was found that 30% of them never brushed their teeth and 25.5% of them did it very rarely. Just 7.7% of them did it three times per day, 18.1% twice per day and 18.4% once per day (see annex 4 – table 3). Even though some people answer of having brushed their teeth, the way or technique that they use is not the correct to eliminate plaque formatting on the surface of their teeth. Moreover, some people do not use toothbrush, instead of that they just use their fingers to clean their teeth or mouth which is not enough to remove plaque. Others use detergent instead of toothpaste which can be harmful if swallowed (personal observation).

In Australia, Alaska, Colombia and Guatemala an irregular use of dentifrices and toothbrush are in part responsible for the poor oral health of indigenous children and adults. Indigenous children of Australia and Alaska reported high prevalence of dental caries and indigenous adults of Colombia and Guatemala reported moderate level of periodontal diseases which are related to the poor oral hygiene practice <sup>21, 32, 36, 37</sup>.

**Diet:** The principal food of the indigenous communities is potato followed by beans and local cereals (quinua, olluco), etc. Even though, according to a study done by GRADE (Analysis group for the



development) in 2006, 47.9% of the population in the community of Fuerabamba and 44.4% of people of the community of Huancuire do not consume the minimum required quantity of calories and proteins. In the community of Pamputa the situation is worst: 76% of the population does not consume the minimum required quantity of calories because of the low economic situation and the low agricultural production that enables trading of products within communities <sup>15</sup>. Moreover, chronic malnutrition is affecting 40% of children under 5 years of age in the area while in the national country is 25% <sup>16</sup>. A study undertaken by Alvarez (1990) in Peruvian children concluded that malnutrition increases caries experience, delayed tooth development and affects the age distribution of dental caries in the primary teeth <sup>42</sup>.

There is no information about quantity and frequency of sugar ingestion in adults and children of Challhuahuacho, but because of the high prevalence of dental caries, it can be assumed the changing of their traditional diet (increasing the consumption of sugar and snacks) due to the proximity to the town of Challhuahuacho and the installation of a mining company and similar was the case of other indigenous communities of Brazil, Ecuador and Australia where the adoption of non-traditional diet (resulting from the interaction to the urban society) increased the prevalence of dental caries <sup>24, 33, 39</sup>.

**Alcohol consumption:** Among the indigenous communities of Challhuahuacho, the alcohol consumption has been related to the traditional festivities and the agriculture duties. However, nowadays, the alcohol consumption is considered a social problem because of the increase in number of men and women consuming it (89% of the population consumes alcohol) which is causing domestic violence and robbery in the area. Even though there is no registered number so as how many people have problem drinking, the population of Challhuahuacho manifests alcoholism as one of the most important social problems <sup>16</sup>.

As it is known, the excessive alcohol consumption can also increase the prevalence of periodontal disease and oral cancer independent to oral hygiene status.

- **Formal and informal dental health service use**

As mentioned before, the health facilities of MINSA in Challhuahuacho do not provide dental services (preventive or restorative) to indigenous people and this is why few people choose travelling to see a dentist to remove their teeth or to fill them.

In 2006, a dental unit was built in the health center of a mining company operating in the area. The unit has inadequate dental service providers; just some voluntary dentists visit the clinic irregularly (every 6 months) providing emergency dental treatment (fillings and extractions) to relief the toothache. According to my experience, many people come by foot from very far away communities waiting to be

attended for dental problems, forming a long queue outside the health clinic. Unfortunately, many of them could not be attended because of the lack of time and the overwork of dentists.

Another alternative for indigenous people is to attend informal dental health services in the town of Challhuahuacho where there is an informal dental technician providing dental rehabilitation (dental prosthesis), extractions and fillings but this merits to be highlighted that the quality of their work in dental rehabilitation and fillings is rated not as good as that provided by the formal dentist. In my personal observation, I had to change some restorations done by this dental technician in patients who attended the dental clinic due to the presence of decay in the tooth around the filling which is a sign of a bad technique or use of bad quality dental material. Moreover, dental prosthesis were not well adapted harming the gum or the palate of patients.

### **3.2.3 Primary Determinants of Oral health**

- **External environment**

The lack of potable water, water cloth sanitation and no fluoride exposure to indigenous people of Challhuahuacho are environment factors contributing to the oral health status of the population. As mentioned earlier, there is no water fluoridation program in the country and fluoridate salt is not accessible for the indigenous communities of Challhuahuacho due to the unequal distribution of it in the country.

As indigenous communities from Australia, Brazil, Ecuador and Chile, there is a negligible implementation of alternative fluoride sources to prevent dental caries.

- **Dental care system**

**Policy:** In Peru there is a lack of oral health policy that ensures equal access to dental care services to the population and the more disadvantaged group are indigenous people. Even more, there is no policy that enables other health workers rather than dentist to conduct the fluoridation programme (fluoride rinsing at 0.2% per week) in schools to prevent dental caries (which is functioning in schools all over the country). As mentioned earlier, there are no dentists in the district of Challhuahuacho and this is why MINSA does not send the material needed for the fluoridation program.

**Organization:** The Ministry of Health has 23 public health facilities in the province of Cotabambas and only 3 of them offer dental care services. These centers are located in the districts of Cotabambas, Haqaira and Tambobamba <sup>16</sup>. There are no other public institutions in the province. Offering dental care services in these provinces just private clinics which are more expensive and which indigenous people of Challhuahuacho have limited access.

**Resources:** The number of dentists in the whole department of Apurimac is very less, there are just 36 dentists working in all the MINSA facilities meaning that the ratio of dentists per population is just 0.08:1000 which is not enough due to the great demand of dental services in the area<sup>5</sup>. Moreover, in the province of Cotabambas-Apurimac there are just 3 dentists working in MINSA health facilities distributed in the districts of Cotabambas, Haqira and Tambobamba which means that there are 0.06 dentists per 1000 inhabitants<sup>5</sup> while in other countries of Latin America there is an average of 0.7 dentists per 1000 inhabitants<sup>7</sup>.

**Financing:** There is a limited budget that MINSA manage to build dental facilities, to buy dental equipments or to hire more dentists in rural areas. However, the SIS insurance offers free dental services for people younger than 17 years of age living in poverty. The insurance covers pain relief (drugs and extractions), conservative measures such as fillings and endodontic and preventive measure such as gel fluoridation. The free dental service is limited to 2 extractions and 6 fillings per year; otherwise they have to pay a minimum fee. Moreover, SIS also pays for ART (atraumatic restorative treatment), a conservative procedure for children without using anesthetics and drills, conducted by dentists in health centers of MINSA<sup>5</sup>.

- **Personal Characteristics**

- Predisposing factors:**

- Education:** There are a great proportion of indigenous people from Challhuahuacho who are illiterate. In Fuerabamba 38.3% and in Huancuire 43.1% of population never received any formal education. Moreover, almost half of the population of those communities did not finish primary school and the district of Challhuahuacho has just 2 public primary schools for the whole population<sup>16</sup>.

- The poor education level of indigenous people from Challhuahuacho can influence their oral health behaviour which has an effect in the oral health status because they are less advantaged to get knowledge about causes of oral health diseases and oral hygiene practices in schools than the general population or they are not able to read related information in books or in the written media.

- Gender:** Among indigenous people of Challhuahuacho, women are more disadvantaged group with higher levels of illiteracy than men. In the community of Fuerabamba, 55% of women vs. of 21.6% of men never attended school while in the community of Huancuire the situation is similar (59.3% of women vs. 26.9% of men)<sup>16</sup>. In our experience, the majority of patients attending the dental clinic were men (58.4%) and the percentage of women examined and treated were 41.6% (see annex 4 - table 1). Therefore, indigenous women of Challhuahuacho are more predisposed to have less access to dental care services than men.

***Enabling factors:***

**Socio-economic status:** The fact that 91% of indigenous people of Challhuahuacho are poor and 84% of them are extremely poor is influencing the access to oral health services and drugs <sup>15</sup>. The no existence of public oral health services in the district is worsening the situation because people can not pay private dental fees or transportation fares.

**Rural character:** Indigenous people of Challhuahuacho live in rural and remote areas. This makes them more disadvantaged to access oral health services. The bad conditions of the road, the cold weather and long distance impede the frequently visits of dentists or the establishment of dental care institutions in the area. This characteristic is shared by indigenous people of Australia, Brazil, Alaska, Colombia, Guatemala, Ecuador and Chile who also live in remote areas which limits or reduces access to dental care services. Furthermore, a study in young indigenous children of Australia found that there is a strong association with living in a rural location and having poor oral health outcomes <sup>34</sup>.

**Dental health insurance:** Indigenous people of Challhuahuacho are not beneficiaries of dental insurance of the SIS as the MINSA has no dental care facilities installed in the area.

***Need for dental treatment:***

The 757 indigenous people from Challhuahuacho (representing 11.7% of the total population) attended by the author and other dentists between 2006 and 2007 reported oral pain and oral symptoms like broken or chipped tooth, gums that bled and bad breath. Even though 1553 fillings and 610 extractions were done as emergency treatment to relief dental symptoms (see annex 4 – table 2), there is still great need (perceived and evaluated) of dental treatment by those patients and probably for the rest of the indigenous population.

Let's now look at oral health programmes carried out in communities living in similar conditions to that of our target group.

## **CHAPTER 4: ORAL HEALTH PROGRAMMES IN INDIGENOUS PEOPLE AND IN RURAL COMMUNITIES**

This chapter is focusing on the description and analysis of oral health programmes in indigenous and rural communities of different parts of the world.

### **4.1 Description of oral health programmes**

Some oral health programmes were conducted for indigenous people in different countries such as Australia, Alaska (USA), Brazil and Peru<sup>20, 21, 23-25</sup>. Each of these programmes was developed because of the high demand of dental treatment.

In Australia, the oral care programme was more curative, trying to relieve the pain of indigenous people of the community of Port-Augusta. For this purpose a dental clinic, with good infrastructure and technical support, was provided to the community hiring local staff and a dentist from the same area<sup>23</sup>.

In Alaska (USA) the oral health programme for indigenous people focused on prevention of dental problems with community participation. Dental therapists who were tribal members from the region provided oral health education, preventive services (fluoride, sealants and cleaning), fillings and uncomplicated extractions. Therefore, it was not language barriers and no unfamiliarity with the rural Alaska environment and culture<sup>21, 25</sup>.

In Brazil, preventive and curative treatments were provided to indians of the upper Xingu, but in a sporadic and irregular way. The programme introduced indigenous health agents in the promotion of oral health<sup>24</sup>.

In Peru (2007), an oral health promotion and care programme was developed for children of rural schools of the provinces of Grau, Antabamba and Cotabambas in Apurimac. The programme involved school teachers, local dentists and health workers. Dentists were trained in ART technique and health workers in developing oral urgent treatment and oral health promotion. Teachers were also informed and oriented about oral health and preventive measures. Moreover, some curative and prevention treatment were done: application of sealants and fluoride varnish, fillings and ART in children. Finally, an information system was established to monitor and evaluate the implemented activities<sup>20</sup>. Unfortunately, the evaluation of the programme is still not ready and it could not be used.

Some other programmes were conducted for communities in rural areas and without or limited access to oral health services:

In South Africa, a mobile dental system was provided to communities with low socio-economic level and with limited or no access to oral health care and it was operated by a team of oral health workers. This service included oral care (tooth extractions, restorations, fissure sealants, topical fluoride

application and ART) and oral health education. This system was effective in increasing access for those dentally underserved communities where thousands of patients were examined and treated <sup>43</sup>.

In Chiangmai, Thailand, a community care model for oral health was established for people living in rural areas. The programme had full participation of the community in the planning and implementation of it which was focused on oral health promotion and prevention. In addition, the establishment of dental units into the existing health service, the instruction of all health workers, teachers and some villagers in the prevention of control of oral health diseases and the evaluation of the programme every 5 years had a successful impact on the results <sup>44</sup>.

In the next part, the above mentioned oral health programmes will be analysed based on SWOT analysis (refer annex 5) and using the WHO criteria for developing oral health strategies (see annex 6).

## **4.2 Analysis of oral health programmes**

### **4.2.1 Oral health programme in the aboriginal community of Port-Augusta, South Australia <sup>23</sup>**

- **Empowering:** The programme included the participation of aboriginal members of the community in its development which was flexibly adapted according to people's feedback. Moreover, the allocation of aboriginal health workers and the employment of local staff as part of the program team were taken in consideration.
- **Participatory:** The programme had the involvement of key stakeholders: representatives of the community, coordinators of the Adelaide University Dental School and the South Australian Dental Service and the manager of special projects of the South Australian centre for rural and remote health.
- **Holistic:** The dental clinic was established within the main health centre (Pika Wiya Health Service) already operating in the area as part of general health.
- **Intersectoral:** There existed collaboration of educational sector (Dental universities), National aboriginal community health sector, private sector (the South Australian Dental service) and research centers (Australian Institute of health and Welfare Dental Statistics and Research unit).
- **Equity:** The programme focused on increasing the access to dental services in rural indigenous communities with the establishment of a culturally sensitive and quality oral health program. For that purpose, it was necessary to employ dentists original from the local area and local staff (living in the community) to reduce ethnical discrimination and language barriers.

- **Evidence-base:** Introduction of evidence-base strategies in the programme like: Fluoride gels in children and tooth brushing education (with fluoridated toothpaste) in schools.
- **Sustainable:** The programme ensured continued positive relationships between local organizations and health staff achieved with the inclusion of local staff in decision-making during the development of the programme. Moreover, it also ensured long-term improvements in the knowledge and oral health promotion strategies of the community at training aboriginal health workers in oral health promotion and disease prevention.
- **Multi-strategy:** The programme included building capacity of the health service and its workers (at training aboriginal health workers in disease prevention and oral health promotion) and advocacy to increase the number of dentists in rural areas. Moreover, it provided emergency and routine dental care, preventative services and community oral health promotion.
- **Evaluation:** Data collection on disease rates and attendance patterns gathered by research organizations to evaluate the impact of the dental services and oral health promotion.

#### 4.2.2 Oral health programme for Alaska natives <sup>21, 25</sup>

- **Empowering:** The introduction of dental health aide therapists in the programme (to provide oral health education, preventive services - fluoride, sealants, ART and cleaning-, fillings, uncomplicated extractions and pulpotomies) who were tribal members from the region trained to do this job. Moreover, Alaska natives were trained to promote oral health and prevention oral health activities with the supervision of a dentist located in a "hub" clinic.
- **Participatory:** Key stakeholders involved in the development of the programme were: the Alaska Dental Society (ADS), the American Dental Association (ADA), members of the Alaska Tribal health system, tribal leaders, federal government and members of the dental health aide program.
- **Holistic:** The oral health programme was a part of the existing general health programme (the community health aide program).
- **Intersectoral:** Involvement and collaboration of the public sector (federal government), private sector (ADS and ADA), health sector for Alaska tribes and education sector (local universities) in the programme.
- **Equity:** The programme reduced language and geographical barriers with the implementation of the oral care service in the area and with the introduction of dental health therapists ensuring familiarity of the rural Alaska environment and culture.
- **Evidence-base:** Tooth brushing education (fluoridated toothpaste), fluoride gel application and ART were included in the programme.
- **Sustainable:** The federal Government provided funds to the tribes to maintain permanently the oral health care programme and to hire

dentists. Furthermore, the training of Alaska natives to be the oral health promoters or dental health aide therapists ensured the long-term access to dental education and preventive dental activities for the community.

- **Multi-strategy:** The programme included education and oral health promotion and advocacy to expand the dental health aide in each Alaska native village and to formulate activities to encourage Alaska natives to choose dentistry as a profession; and the development of dental health aide therapists.

#### 4.2.3 Oral health programme in Indians of the upper Xingu, Brazil<sup>24</sup>

- **Empowering:** The formation of indigenous health agents in promoting oral health.
- **Participatory:** Participation of key stakeholders: dentist coordinators of the Brazilian University of dentistry in Sao Paulo, the FUNAI (the National Foundations for Indians) and donors.
- **Intersectoral:** The collaboration of education sector (school of dentistry, University of Sao Paulo) and relevant organizations like the FUNAI and the Oswaldo Cruz Foundation. The Government has limited involvement in the project.
- **Equity:** The programme did not ensure equal access to dental services compared with the rest of non-indigenous population. It consisted of just two annual sessions for the duration of two weeks because of geographical distances between the tribes and nearby cities, cultural and language barriers.
- **Evidence base:** Preventive strategies used: application of fluoride gel and tooth brushing education (fluoridated toothpaste).
- **Sustainable:** Because the programme was a voluntary work, the presence of dentists was sporadic and irregular and there was a low incorporation of dental care services. Lack of funds and human resources.
- **Multi-strategy:** The programme just provided oral health education, prevention and curative treatment. However, other aspects such as policy and community development or legislation and advocacy were not part of it.

#### 4.2.4 Oral health programme for indigenous children of Grau, Antabambas and Cotabambas in Apurimac, Peru<sup>20</sup>

- **Empowering:** Community participation in the programme: local dentists and health technicians were trained on application of fluoride gel and on ART; teachers were trained on basic knowledge of oral health and preventive measures and some health technicians were also trained on providing emergency oral treatment.
- **Participatory:** The participation of key stakeholders in the programme: representatives of the local government, the regional health authority of Apurimac and local leaders, external and regional dentist coordinators of



the program, Dutch NGO DHIN (Dental health international Netherlands) and donors (ZME-Zahnmedizinisch Entwicklungshilfe) in the development of the programme.

- **Intersectoral:** Support of the health sector or DIRESA (the regional health authority) of Apurimac, the education sector and important NGOs in the programme.
- **Evidence base:** Introduction of ART treatment in the project as part of the dental service of the Regional health authority (DIRESA) and fluoride gel.
- **Sustainable:** The financing health insurance system (SIS) is responsible of paying ART fillings done in health centers for poor children. The only constraint is that SIS does not pay for ART fillings done by dentists in their rural posts and schools. Moreover, lack of donors in the provision of tooth brushes and tooth paste for the people.
- **Multi-strategy:** The provision of oral health education, conservative and prevention activities and organization change (task shifting in dental care at training health technicians in caries recognition, application of fluoride gel and ART).
- **Evaluation:** Evaluation and monitoring system of the activities. There were problems in documentation of the dental attention and monitoring system. It was also lacked regular supervision of the trained health workers by dentists in charge of the program because of workload, time constrains, transport and financial barriers.

#### 4.2.5 Oral health programme in South Africa (the mobile dental system) <sup>43</sup>

- **Empowering:** There was no community participation in the project.
- **Participatory:** Key stakeholders present in the programme were: project coordinators and dentists of the University of the Witwatersrand (Department of Community dentistry), representatives of the Government, and local authorities.
- **Intersectoral:** Collaboration of the education sector (university and schools), health sector (division of Public oral health in Johannesburg) and WHO Collaborative center for oral health care in the Netherlands.
- **Equity:** The mobile dental system increased access to dental services in different rural communities.
- **Evidence base:** The introduction of ART in the programme to increase number of fillings and to reduce extraction in children which made the programme more preventive and patient-friendly.
- **Sustainable:** Limitations of funds for the programme.
- **Multi-strategy:** The programme provided comprehensive oral health care and oral health education in communities and schools. Other aspects like: policy development, organizational change, legislation and community development were not present.

#### 4.2.6 Oral health programme in Thailand (a community care model) <sup>44</sup>

- **Empowering:** The programme was based on empowering local people and through community participation. Village health workers, schoolteachers and village health volunteers were training on oral health examination and oral health promotion. Some of them were also trained to perform dental scaling (calculus removal). Moreover, the community was involved in making decisions about planning and implementation of the programme: training and discussion with teachers and health care volunteers, agreement on financing and arrangement group travel of people to the health restorative center to receive treatment.
- **Participatory:** Active participation of key stakeholders in the programme: local leaders, dentist coordinators from the Thammasat University - faculty of dentistry, local health workers, teachers and representatives of the Government.
- **Intersectoral:** The programme had the collaboration with the health sector (the Ministry of Public health) and the education sector (local university and schools).
- **Equity:** The programme was developed to increase access to oral health care in rural areas. For that purpose, health maintenance units were established at village level (providing oral examination and education) and health restorative centers were established at the province level.
- **Sustainable:** Because the programme empowered local people, it ensured maintenance and sustainability of it. However, there were some difficulties in logistic, finance and organization of the program.
- **Multi-strategy:** The programme included: oral health education and promotion, community development, organizational change and advocacy (to extend the programme to other cities of Thailand).
- **Evaluation:** Evaluation of the programme in cost-effectiveness, acceptability, activity achievement, average time given for each procedure and in dental health improvements (oral health surveys of prevalence of dental caries, periodontal diseases, oral hygiene). However, the evaluation process had some difficulties of data collection, time to evaluation and interpretation of the data in future planning. In addition, dental health outcomes were evaluated every five years and not every year as recommended by WHO.

### 4.3 Analysis and discussion:

- **Empowering**

The oral health programmes in Thailand, Peru, Alaska, Brazil and Australia included some elements of empowerment of individuals and communities to have better oral health outcomes such as:

a) To increase knowledge about oral health diseases and prevention to have control over those personal factors or behaviours affecting their oral health such as: tooth brushing, diet (including benefits of consuming non-cariogenic diet or reducing sugar consumption), consequences of tobacco and alcohol ingestion in their oral health and the importance to use oral health services provided in the programme (preventive, treatment and restorative).

b) To have control over their socio-economic (enabling) factor: The programme in Thailand included local leaders, teachers and health care volunteers in agreement on financing issues and in organizing group travels of people to the dental clinic <sup>44</sup>.

c) To assume responsibilities over the external environment: In communities without natural fluoride sources, other alternatives for administering fluoride to prevent dental caries was considered. Tribal members (in Alaska and Brazil), aboriginal health workers (in Australia) and local dentists and health technician (in Peru) were trained in application of fluoride gel. Unfortunately, none of the oral health programmes focused on communal water quality and sanitation improvements.

Moreover, community participation in the planning and implementation of the oral health programme was present in Thailand, Alaska, Peru and Australia (where the programme was adapted according to the feedback provided by the indigenous community<sup>23</sup>).

All of the activities of empowerment proposed in each programme were very important and they seem to be feasible for the oral health programme for the indigenous people of Challhuahuacho.

- **Participatory**

Each oral health programme analysed involved key stakeholders during the planning and implementation of it. Roles of tribal or local community leaders, health system and local government representatives, coordinators of Dental universities, members of Dental associations, dentist coordinators, donors, regional health authorities, NGOs, local health workers and school teachers were essential for the building and implementation of oral health programmes. However, in the programme of Brazil, some key stakeholders were left out (community leaders and some government representatives who are primordial for the development of a programme) and this could be one of the causes for the programme not delivering a positive impact on the population.

- **Holistic**

There is a strong correlation between oral and general health and there are also some common risk factors shared by oral diseases and noncommunicable chronic diseases (cardiovascular diseases, diabetes, cancer and chronic obstructive pulmonary diseases) such as: dietary habits (sugar consumption and carbohydrates), tobacco, alcohol and poor oral hygiene. For example, severe periodontal disease is associated with diabetes<sup>6</sup>.

In the oral health programme of Australia the dental clinic was located within the health centre promoting dental care as an integral part of general health and this holistic approach was also part of the programme in Alaska which was an expansion of the community health aide programme operating in the area. However, in the other programmes there was no explanation over the correlation and importance of a good oral health programme into general health.

What we can also learn from other oral health programmes is the integration of oral health policy elements into general health promotion programmes to develop collaborative approaches for common risk factors like tobacco, sugar and alcohol consumption, chronic medication, etc (in South Africa)<sup>44</sup>. Moreover, it also worked the integration of oral health programmes into general health promotion activities such as in vaccination, first aid, HIV/AIDS and de-worming programmes (in Tanzania)<sup>44</sup> and conducting antenatal oral health care sessions (in Glasgow, UK)<sup>45</sup>.

- **Intersectoral**

Each oral health programme analysed had established collaboration with different sectors and relevant agencies:

a) The educational sector (including Dental universities and schools) such as the programmes in Australia, Alaska, Brazil, Peru, South Africa and Thailand had.

b) The health sector such as the South Australian Dental service and the National aboriginal community health sector (in Australia); ADA and ADS (in Alaska); DIRESA (in Peru); the division of Public oral health (in South Africa) and the Ministry of Public health (in Thailand).

c) The public sector or the federal government in each programme and

d) Some relevant agencies like: Research institutions (in Australia), the FUNAI and the Oswaldo Cruz Foundation (in Alaska), the WHO Collaborative center for oral health care in the Netherlands (in South Africa) and different NGOs.

Each sector had specific role to play on the oral health programmes: in financing, training, human resources, political support, changing or implementing policies and consultancy. For these reasons the involvement of these sectors could be also applicable for the oral health programme of indigenous people in Challhuahuacho.

- **Equity**

Some oral health programmes analysed also developed some strategies to diminish inequalities in oral health outcomes (oral health status) and to bring better access to oral health care (patient satisfaction) of indigenous people or rural communities:

One way to reduce language (communication) and cultural barriers between oral health system and indigenous people, used for the programme in the aboriginal community of Port-Augusta in South Australia, was to employ a dentist or dental assistants original from the area because they can speak the same language of indigenous people who can feel identified and confident with them <sup>46</sup>. It was also the case of the programme in Alaska where language barriers were eliminated with the incorporation of dental health therapists because they were tribal members trained to do this job <sup>21</sup>. There is evidence that the incorporation of indigenous health workers or local people in health programmes can increase the number of patients attended and it serve to gain the confidence of indigenous communities in the activities and services provided by health services <sup>17</sup>.

Furthermore, in order to reduce geographical barriers, the oral health programme in South Africa introduced the utilization of a mobile dental unit in rural areas including curative and preventive treatment <sup>43</sup>. In Australia a dental clinic for indigenous people was established in the main health center operating in the area but the weak part was that it failed in organizing schedule appointments and some people could not be attended and others had to wait for long time in the queue (not assuring quality of care) <sup>23</sup>. Another alternative done in Thailand was the establishment of health maintenance units at village level (providing oral examination and education) and health restoratives centers at the province level. Transportation issues were arranged by the community <sup>44</sup>.

On the other hand, the oral health programme in Brazil provided dental treatment but in a sporadic and irregular manner because of the lack of dentists available and the lack of economic support <sup>24</sup>. This was one of the reasons why the programme did not have a successful impact in the reduction of oral health diseases in indigenous people.

- **Evidence base**

One of WHO's policies is to support the use of *fluoridated toothpaste* in developing countries and among vulnerable groups as it is considered an effective public health measure in caries prevention <sup>6, 27</sup>. There is evidence-based that the regular use of fluoride toothpaste is associated with a caries reduction and the effectiveness of this intervention is related to the increased frequency of use and with supervised brushing <sup>47</sup>.

In the oral health programmes of Australia, Alaska and Brazil the tooth brushing education (with fluoride toothpaste) was a part of a set of measure for oral health prevention.

Another effective intervention is the application of *fluoride gel* in reducing tooth decay in children and this is why in many countries, it is being widely used in school caries preventive programmes. Its application is relatively

easy and can be applied by a professional or self-applied under supervision but it is currently recommended only for children with moderate and high caries levels and not in young children because of the risk of over ingestion and associated side-effects<sup>48</sup>. In oral health programmes for indigenous children of Australia, Alaska, Brazil and Peru, fluoride gels were used and applied by trained aboriginal health workers, tribal members and health workers.

Finally, PAHO has demonstrated that the ART technique is a cost-effective intervention to increase access to oral health services in vulnerable groups and requires minimal training and resources for caries treatment and prevention<sup>27</sup>. In South Africa, the incorporation of ART approach in the mobile system program appeared to be very effective in increasing tooth restoration, reduced extraction and made oral care more preventative. In addition, it was the first choice of dentists to treat carious single or multiple surface lesions in premolar and molar without exposed pulp because ART restoration has an overall low cost, and does not need the use of local anesthetics and noisy drills making the procedure more acceptable for patients and reducing the fear to dental treatment (ART requires only the use of hand instruments without the use of electricity)<sup>43</sup>. ART was also used in the programmes of Alaska and Peru where more than 850 ART restorations with good quality were done in indigenous children<sup>20</sup>.

- **Sustainable**

Some points of sustainability included in oral health programmes analysed were:

*Building capacity of the Dental care system (Resources):* Training aboriginal health workers, local health staff and school teachers ensured long-term improvements in the knowledge and oral health promotion activities (fluoridation, tooth brushing and ART) in members of the community in programmes of Australia, Alaska, Peru and Thailand. Moreover, the introduction of dental aide therapists (trained tribal members) in the programme of Alaska ensured the permanent provision of oral health professions for bringing basic dental care (filling, uncomplicated extractions and pulpotomies) and prevention activities (ART, sealants and dental scaling). Finally, in the programme in Thailand, local people were trained to be villager scalers and oral health examiners to maintain a good referral system to the dental health center in the province. But the villager scalers programme did not work and it was recommended not to extend to other villages. This could have been due to not enough and proper training. In Alaska where there are Universities offering courses to train dental aide therapists or to give special training in oral health made the programme successful.

*Financial aspects:* In Alaska, the federal Government gave funds permanently to the tribes to be responsible of their own oral health. With this money they can maintain an oral health programme in their

communities. In Peru, there was a cost-shifting between the Government and NGOs: the Regional health authority and the national health insurance system (SIS) have been paying for ART made by dentists in health centers (it is free for all children of the area) and NGOs equipped public dental centers. Moreover, there was a voluntary work of dental students and dentists to be part of the programme but if there is inadequate work incentives like good remuneration, a decent place to live, communication facilities (radio, telephone) and paid holidays for dentists; the programme can fail in the future like as was the case of the programme in Brazil where voluntary dentists visited the area in sporadic and irregular manner affecting the oral health status of the indigenous communities.

*Organizational support:* The inclusion of local health staff and community leaders in decision-making and development of the programme in Australia ensured continued positive relationships between local organizations and the health staff.

- **Multi-strategy**

A combination of approaches was necessary in the development of oral health strategies.

*Policy development:* In Alaska, a policy of the creation of dental health aide therapists increased the access to dental care services for Aboriginal people<sup>21</sup> which seems not applicable for indigenous people in Peru due to the lack of courses in Dental universities to train people how to make fillings and extractions and the possible disapproval by the Dental association in the country.

Others programmes analyzed did not create policies to improve people's oral health and it is important to highlight that some policies are effective in reducing the prevalence and severity of dental decay like was the case of the oral health programme in high deprivation parts of Glasgow (UK, 2006) with the development of healthy snacks policies and tooth brushing policies at nurseries<sup>45</sup>.

*Organizational change: Task shifting* in dental care services between dentists and health workers (trained in caries recognition, application of fluoride gel and ART which do not need a complex training) was part of the programme in Peru. Indigenous health workers in the programme of Australia were also incorporated to be in charge of reception of patients, research assistance, client recruitment, follow up and programme development. Moreover, in Thailand, village dental units (in charge of trained local people) were built to refer patients of the existing dental health services in the province with which they worked together.

Task shifting can be also applicable for the program of Challhuahuacho but it is important to emphasize that some health workers and trained local people would need incentives for extra activities to ensure good quality of the provided services.

*Advocacy:* Advocacy was targeted to increase the number of dentists working in rural areas (by the South Australian centre for rural and remote health), to encourage Alaska natives to choose dentistry as a profession including financial assistance programmes as an incentive for them to return and provide dental care in remote areas (by ADA, ADS and tribal leaders) and to extend the oral health programme to other cities (in Thailand).

*Education and communication in oral health promotion:* It was included in oral health programmes in Australia, Alaska, Brazil, Peru, South Africa and Thailand where villagers or aboriginal health workers, school teachers and some indigenous people received oral health education in causes, consequences, prevention and recognition of dental diseases. They were also trained to be oral health promoters in the communities and schools.

According to PAHO most oral diseases are preventable and with simple health education can increase oral health awareness and oral hygiene practices in the population <sup>27</sup>. For example in the urbane- marginal communities of Carabayllo in Peru, people showed positive changes on their knowledge, attitudes and behaviors (sugar consumption and diet) affecting their oral health status following a community-based intervention programme <sup>49</sup>. Furthermore, the oral health education programmes given in schools of Tanzania had positive impact on children's oral health (oral health knowledge, attitudes and behaviors) and in the school environment <sup>44</sup>.

- **Evaluation**

The aims to evaluate oral health promotion programmes are: "to develop good practices, to make best use of limited resources, to provide feedback to the staff and participants and to inform in the development and implementation of the programme" <sup>50</sup>. The evaluation process should be also part of the planning process of each programme based on the assessment of objectives. Oral health promoters, policy makers, funding agents and community representatives should be involved in the evaluation process to bring more credibility to the results. It is necessary that the support of more staff and expertise in the evaluation of the programme like social sciences, organizational theory, policy development and community action <sup>50</sup>. This is why the data collection in the evaluation process in Australia was under the charge of research experts in the field.

Moreover, in order to evaluate the outcomes of an oral health programme (behavioral variables, self-care and indicators of empowerment), qualitative and quantitative methods should be used taking in consideration the limitations of randomized controlled trials in evaluation of public health interventions <sup>44, 50</sup>. For example, the programme in Thailand was evaluated in acceptability of the people, activity achievement, cost-effectiveness, average time given for each dental procedure and dental health improvements (surveys of the prevalence of dental caries, periodontal diseases and oral hygiene practices) of the population which was very



useful on planning schedules but it had some difficulties because of time constraints and problems to interpret the data. In addition, dental health outcomes were evaluated every five years and not every year as recommended by WHO<sup>44</sup>.

Finally, in the monitoring system, the programme in Peru reported some problems in documentation of the number of dental attentions and some dental activities done by dentists and health workers. It was also due to the lack of regular supervision of trained health workers by dentists in charge of the programme because of workload, time constrains, transport and financial barriers<sup>20</sup>.

In the next section, conclusions are drawn and recommendations made.

## CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions:

- Indigenous people of Australia, Brazil, Alaska, Colombia, Guatemala, Ecuador, Chile and Peru present with high levels of oral diseases (dental caries and periodontal diseases) and in the majority of the cases, their oral situation is worse than the rest of the non-indigenous population in the country.
- Quechua indigenous people of Challhuahuacho-Apurimac, Peru have bad oral health outcomes: high levels of dental caries (DMFT score of 14.3), presence of periodontal diseases in adults and high levels of dental caries in children (dmft score of 5.7 in 6 year-old children); limited access to dental care services and communication problems with health providers; therefore, it is concluded the necessity to implement preventive and public health strategies that have successful impact in other countries to improve their oral health status.
- The fact that the bad oral health outcomes experienced by indigenous people of Challhuahuacho are influenced by their bad oral health behaviours, there is an urgency to implement oral health preventive strategies to improve people's toothbrush and diet, to reduce their alcohol consumption and to increase the use of formal dental services. Moreover, there is a need to think how to overcome all of those factors (external environment, a weak dental care system and some personal characteristics of the population) determining the bad oral health behaviours of indigenous people of Challhuahuacho at the moment to implement an oral health programme suitable for them.
- Because part of the data gathered by the author of this thesis has some limitations or it was based on her personal observation, there is also necessary to make more research in the field.
- Some successful interventions used in oral health programmes of Australia, Alaska, Brazil, Peru, South Africa and Thailand to improve people's oral health outcome, seem to be also applicable for Quechua indigenous people of Challhuahuacho which need to be adapted to their situation. Moreover, there is important to include the criteria stipulated by WHO to develop a good quality oral health programme.

In the following section a set of recommendations will be given for an oral health programme in Quechua indigenous communities of Challhuahuacho-Apurimac, Peru based on the lessons learned from the previous analysis.

### 5.2 Recommendations

- **Research:** If funds permit, it will be ideal to conduct a research in oral health of indigenous people of Challhuahuacho-Apurimac, Peru before developing an oral health programme. Prevalence of oral diseases among the indigenous people (dental caries and periodontal diseases) categorized in aged groups, oral health behaviors like sugar

consumption, diet and dental hygiene practices (frequency of tooth brushing), access and use of formal and informal dental services are necessary in order to analyze the achieved outcomes of the programme (before and after the program) and to make proper interventions.

- **Public health interventions:**

**Empowering:** Training some local people, indigenous health workers, school teachers, health personnel of the MINSA and health promoters (local people trained to promote family planning, the use of health services and to counsel indigenous people in domestic violence and drugs use) to be oral health promoters in schools, health posts and in the community of Challhuahuacho. Moreover, some of them can be trained in application of fluoride gel, in ART techniques and in the recognition of dental caries and to refer patients to a dental care service; and finally, to include local leaders and health workers in arranging financing issues on the oral health programme.

**Participatory:** The involvement of key stakeholders: members of the community assembly, the local government, manager of the social department of the mining company, the regional health authority of Apurimac (DIRESA), doctors responsible of the health post, members of the APAFA (parents' organization) and school teachers during the planning, implementation and development of the oral health programme in Challhuahuacho (there is a detail description of the activities which they need to be involved in annex 7). Finally, discussion on choosing local people to be oral health promoters or trained in prevention activities, frequency and place of providing the oral health education for the community, financing issues and organization of groups of people or communities to be attended by the dental clinic are issues in which the community must be involved.

**Holistic:** The oral health programme can be adapted to other health programmes controlled by the two public health posts in Challhuahuacho. For example: in antenatal care (ANC) or children vaccination, mothers can receive information about the importance to maintain a good oral health and how oral health influences their general health. In addition, campaigns of children Fluoridation and ART can be done in the health post.

**Intersectoral:** It is necessary to establish a collaboration of the health sector (DIRESA and MINSA), the educational sector (local universities of dentistry and schools), the public sector, local government and Proinversion (which is a public organization keeping the money donated by the mining company to make social projects in favor of the community), the private sector (mining company in the area) and local NGOs during the implementation of the oral health programme for Quechua indigenous people in Challhuahuacho.

**Equity:** In the oral programme for indigenous communities of Challhuahuacho-Peru, dentists or assistants with indigenous background and community health workers should be incorporated to reduce cultural barriers (language impediments and ethnical discrimination) and to increase number of patients coming to receive treatment in an oral health center. Moreover, it is necessary to ensure good quality of dental care services at organizing schedule appointments to avoid overwork and long waiting time and good attitude of health workers by training and bringing them adequate work incentives. The provision of dental care facilities with adequate equipment and dental materials is also needed. Finally, the program can start organizing visits of dentists in a regular way to provide curative treatment, training and supervision of the program. Another alternative could be to provide a mobile dental unit to the program to reduce geographical barriers of access to dental services.

**Evidence base:** The oral health programme for indigenous people in Challhuahuacho should include strategies proved to be effective in reducing or preventing oral dental caries and periodontal diseases like: Fluoride gel application every 6 months in children with moderate and high level of dental caries by a dentist or personnel trained to do it, promotion of tooth brushing and fluoride toothpaste in schools and in the community by teachers, dentists and oral health promoters and ART (atraumatic restorative treatment) to increase number of tooth restoration in children and to prevent dental caries.

**Sustainable:** In order to maintain the programme in Challhuahuacho, there are some strategies that can be followed like: a) building capacity and resources by training community health workers, local health staff and school teachers to ensure long-term improvements in knowledge of the population about causes, consequences and prevention of oral diseases. b) Including the ART treatment and application of fluoride gel as part of the comprehensive health insurance (SIS) for children. SIS can pay for the materials needed as it has been done in other parts of the country. Moreover, after every dental treatment (fillings and extractions), people can pay a minimum fee to cover dental material expenses and other costs. c) An agreement with local universities should be done to send voluntary dental students permanently to provide oral health education and preventive treatment as part of their curricula. d) Finally, the inclusion of local health staff and community leaders in decision-making to ensure a continuous organizational support.

**Multi-strategy:** The oral health programme in Challhuahuacho should include many approaches: a) the creation of policies in schools of Challhuahuacho to include oral health and tooth brushing education as part of their curricula and healthy snacks policies, b) task shifting

between dentists and health workers in oral examination, fluoride gel application and ART (with proper work incentives), c) advocacy to enable health workers and oral health promoters collaborating to the National fluoridation programme (fluoride rinsing at 0.2% per week) in schools of Challhuahuacho and advocacy for improvements in sanitation and water quality, d) education and communication in oral health promotion in schools or in the community to improve knowledge about oral diseases (causes, consequences and prevention), to change behaviors or personal practices (adequate tooth brushing, diet and reduction of sugar and alcohol consumption) and to instruct people in the importance to use formal dental services (preventive and restorative treatment).

**Evaluation:** Monitoring and evaluation process should be done by dentist coordinators and research team. The activities planned during the programme in Challhuahuacho such as training, preventive treatment (ART, Fluoride gel application, etc) and curative treatment (fillings and extractions) should be monitored and supervised in a regular basis/interval. Moreover, the results of the programme (oral health status, behavioral variables, activity achievement, acceptability of the people and cost-effectiveness) should be evaluated every year using qualitative and quantitative methods and having in consideration the time needed and the support of experts in the field.

- ***Emergency dental treatment:***

Because there is already a dental unit established in the health center of a mining company to attend indigenous people of Challhuahuacho, the social department of the mining company can still continue programming visits of dentists (every 3 or 4 months) to provide emergency dental treatment to pain relief like fillings and extractions but it should be in a regular way.

A list of activities involved all the recommendations proposed can be found in annex 7.

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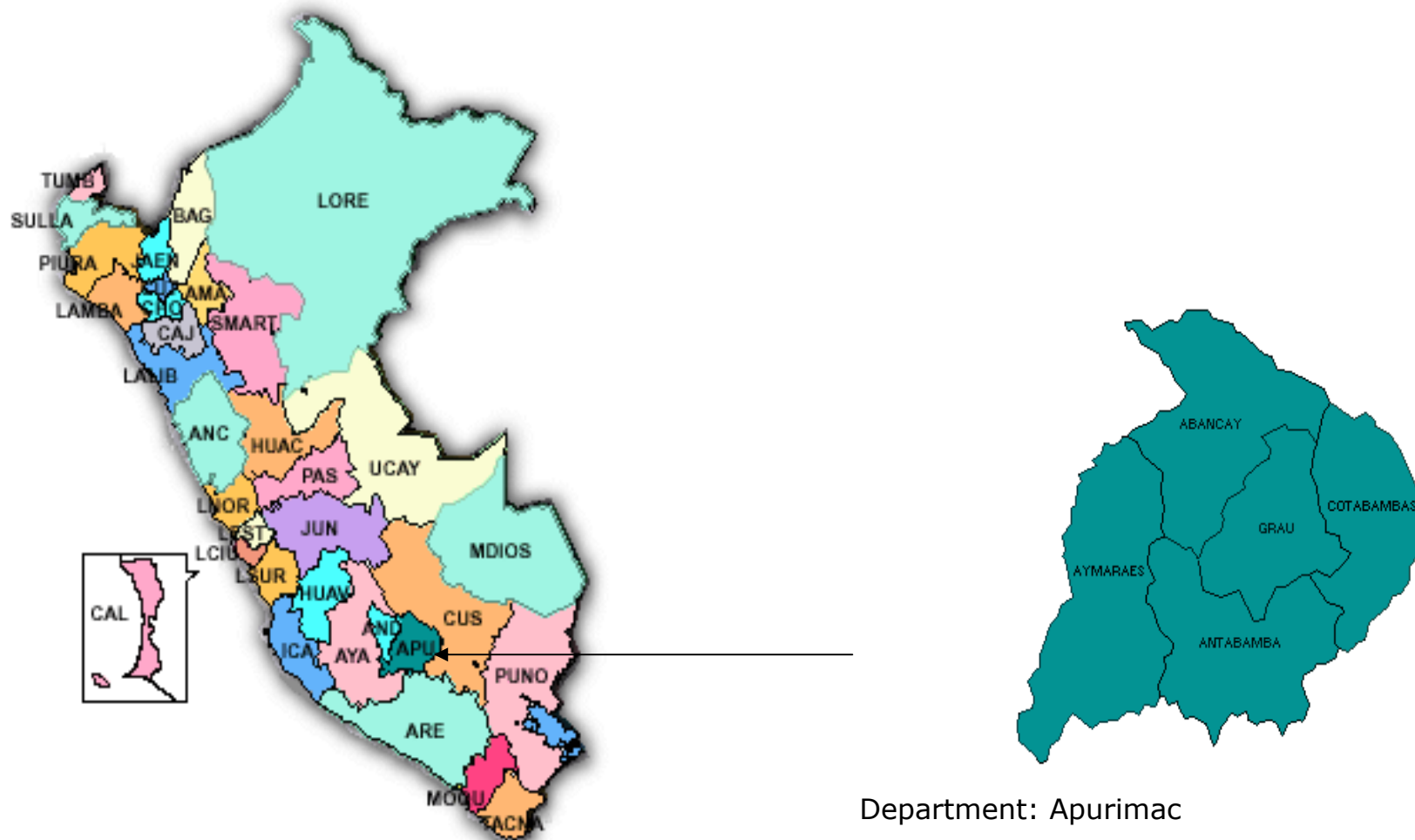
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**ANNEXES**

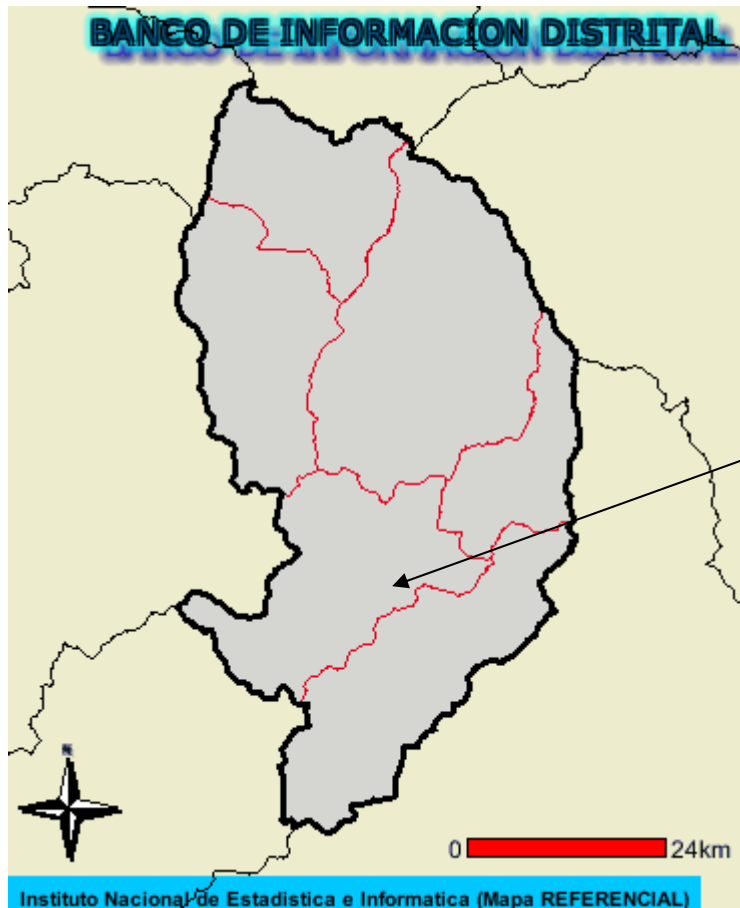
**Annex1: Map of Peru and Apurimac**



Department: Apurimac

Country: Peru

## Annex 2: Map of Cotabambas and Challhuahuacho



Province: Cotabambas



District: Challhuahuacho

### Annex 3: Dental Caries Prevalence and Severity

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**DMFT/dmft and DMFS/dmfs** indices describe the severity of dental caries in an individual. DMFT and DMFS are measures to numerically express the caries burden in permanent teeth and are obtained by calculating the number of teeth (T) or surfaces (S) which are:

- Decayed (D)
- Missing due to caries (M)
- Filled (F)

The decayed (d), missing due to caries (mt), and filled (f) teeth (t) or surfaces (s), is used for the primary dentition. It is thus used to get an estimation illustrating how much the primary dentition until the day of examination has become affected by dental caries. The Decayed (D), Missing due to caries (MT), and Filled (F) Teeth (T) or Surfaces (S) refers to the permanent dentition. Indices are either calculated for 28 (permanent) teeth, excluding 18, 28, 38 and 48 (the "wisdom" teeth) or for all 32 teeth (The Third edition of "Oral Health Surveys - Basic methods", Geneva 1987, recommends 32 teeth). Thus, the caries indices give answers to the following questions:

- How many teeth/tooth surfaces have caries lesions (caries at cavitation level)?
- How many teeth/tooth surfaces have been lost due to tooth decay?
- How many teeth/tooth surfaces have fillings or crowns?

The sum of the three figures forms the caries index score. For example: DMFT is 16 if 4 permanent teeth are decayed, 3 teeth are missing due to caries and 9 teeth have fillings.

Note: If a tooth has both a caries lesion and a filling it is calculated as D only. A DMFT of 28 (or 32, if "wisdom" teeth included) is maximum, meaning that all teeth are affected. For the primary dentition, the maximum is 20 teeth.

Source: WHO

<http://www.who.int/infobase/reportviewer.aspx?rptcode=ALL&surveycode=160547f2&dm=6&print=1#pgstring1>

**Annex 4: Primary data of oral health situation of indigenous communities of Challhuahuacho – Apurimac, Peru**

**TABLE 1  
PATIENTS ATTENDING A COMMUNITY HEALTH CLINIC FOR DENTAL CARIES MANAGEMENT**

SEX	2006		2007 (I)		2007 (II)		TOTAL	
	N.	%	N.	%	N.	%	N.	%
<b>MALE</b>	126	58.6%	223	59.2%	93	56.0%	442	58.4%
<b>FEMALE</b>	88	41.4%	154	40.8%	73	44.0%	315	41.6%
<b>TOTAL</b>	214	100%	377	100%	166	100%	757	100%

**TABLE 2  
TREATMENTS OF PATIENTS ATTENDING A COMMUNITY HEALTH CLINIC**

TREATMENT	2006		2007 (I)		2007 (II)		TOTAL	
	N.	%	N.	%	N.	%	N.	%
<b>Fillings</b>	524	69.9%	613	71.3%	416	75.2%	1553	71.8%
<b>Extractions</b>	226	30.1%	247	28.7%	137	24.8%	610	28.2%
<b>TOTAL</b>	750	100%	860	100%	553	100%	2163	100%

**TABLE 3**  
**TOOTH BRUSHING FREQUENCY OF PATIENTS ATTENDING A COMMUNITY HEALTH CLINIC**

TOOTH BRUSHING FREQUENCY	2006		2007 (I)		2007 (II)		TOTAL	
	N.	%	N.	%	N.	%	N.	%
<b>Once per day</b>	40	18.7%	72	19.1%	27	16.3%	139	18.4%
<b>Twice per day</b>	51	23.8%	63	16.7%	23	13.8%	137	18.1%
<b>Three times per day</b>	19	8.9%	27	7.2%	12	7.3%	58	7.7%
<b>Rarely</b>	46	21.5%	98	25.9%	49	29.5%	193	25.5
<b>Never</b>	58	27.1%	117	31.1%	55	33.1%	230	30.3%
<b>TOTAL</b>	214	100%	377	100%	166	100%	757	100%

**TABLE 4**  
**THE MEAN AND PERCENTAGE OF DMFT SCORE AND ITS COMPONENTS**

DMFT	2006		2007 (I)		2007 (II)		TOTAL	
	Mean	%	Mean	%	Mean	%	Mean	%
<b>Decayed (D)</b>	8.8	58.6%	7.8	54.2%	7.9	60.3%	8.2	57.3
<b>Missing (M)</b>	5.6	37.2%	5.8	40.2%	4.1	31.3%	5.3	37.1%
<b>Filled (F)</b>	0.6	4.2%	0.8	5.6%	1.1	8.4%	0.8	5.6%
<b>TOTAL</b>	15.4	100%	14.4	100%	13.1	100%	14.3	100%



### Annex 5: SWOT analysis of oral health programmes

Oral health programme	Strengths	Weaknesses	Opportunities	Threats	Suggested recommendations
<p style="text-align: center;">In the aboriginal community of Port-Augusta, South Australia 23</p>	<ul style="list-style-type: none"> <li>• Location: The dental clinic was established within the main health centre already operating.</li> <li>• The employment of a dentist original from the local area.</li> <li>• The dental care service provided emergency and routine dental care, preventative services and oral health promotion.</li> <li>• The dental service had a good infrastructure and technical support.</li> <li>• The allocation of aboriginal health workers in the programme.</li> <li>• It was a high demand for dental services.</li> <li>• The employment of local staff.</li> <li>• Including local staff in decision-making and in the development of the program.</li> <li>• Evaluation of the programme.</li> </ul>	<ul style="list-style-type: none"> <li>• Failure to attend scheduled appointments. No all demand of treatment was attended.</li> <li>• Curative emergency care was the principal objective of the program, rather than preventative.</li> </ul>	<ul style="list-style-type: none"> <li>• There was a close affiliation between the health service and the aboriginal health council.</li> <li>• The program was flexible to be adapted with feedback from the community.</li> </ul>	<ul style="list-style-type: none"> <li>• Patients did not perceived oral health as a part of general health.</li> <li>• Time that patients had to wait because of the grand demand of dental services.</li> <li>• Distance: patients had to travel in excess of 3 hours to the dental service.</li> <li>• Cost of transportation and other cost that people had to pay for the dental service.</li> </ul>	<ul style="list-style-type: none"> <li>• Try to employ a dentist or assistants original from the local area.</li> <li>• Focus on prevention of dental problems.</li> <li>• To organize scheduled appointments for the curative treatment (no long waiting time).</li> <li>• To allocate aboriginal health workers to the oral health program.</li> <li>• To be flexible in adapting the program with the feedback of the community.</li> <li>• Include local staff in the development of the programme.</li> <li>• To evaluate the programme.</li> </ul>

Oral health programme	Strengths	Weaknesses	Opportunities	Threats	Suggested recommendations
<p>In Alaska natives <sup>21, 25</sup></p>	<ul style="list-style-type: none"> <li>• Alaska natives were trained to promote oral health and prevention of oral health diseases with the supervision of dentists in the main health center.</li> <li>• Introduction of the dental health aide therapists who were tribal members from the region trained to do this job.</li> <li>• The dental health aide therapists provided: oral health education, preventive services (fluoride, sealants and cleaning), fillings and uncomplicated extractions.</li> <li>• No language barriers and no unfamiliarity with the rural Alaska environment and culture.</li> <li>• Full time presence of dental health aide therapists in the area.</li> </ul>	<ul style="list-style-type: none"> <li>• Limitations in the work of dental health aide therapists.</li> </ul>	<ul style="list-style-type: none"> <li>• The federal government gives funds to the tribes to be responsible of their own oral health.</li> <li>• The dental health aid program is an expansion of an existing health program (the Community health aide program) to address the oral health needs of Alaska Natives in rural settings.</li> </ul>	<ul style="list-style-type: none"> <li>• Geographic isolation of tribal populations: Villagers must travel hundreds of miles by bush-plane or boat to obtain dental care.</li> <li>• Inability to attract dentists to practice on tribal health facilities in rural areas.</li> <li>• The extreme temperatures of the area.</li> <li>• The lack of dentists of American Indian and Alaska native ethnicity.</li> </ul>	<ul style="list-style-type: none"> <li>• To train members of the community in promoting oral health and prevention of oral health diseases.</li> <li>• Supervision and evaluation of these people by a team of dentist.</li> <li>• To provide preventive dental services for children: application of fluoride gel and sealants by a group of dentists every 4 months.</li> </ul>

Oral health programme	Strengths	Weaknesses	Opportunities	Threats	Suggested recommendations
<p>In Indians of the upper Xingu, Brazil <sup>24</sup></p>	<ul style="list-style-type: none"> <li>• The provision of a dental program providing: prevention of dental problems (application of fluoride gel and teaching who to brush their teeth) and some attendance services, mainly extraction.</li> <li>• The formation of indigenous health agents in promoting oral health.</li> </ul>	<ul style="list-style-type: none"> <li>• Low incorporation of dental care services.</li> <li>• The irregularity of the services programmed for these communities.</li> <li>• Presence of dentists was sporadic and in an irregular way.</li> <li>• A high level of dental treatment needs (high dmft and DMFT scores observed) in these communities.</li> </ul>	<ul style="list-style-type: none"> <li>• Presence of FUNAI (The National Foundation for Indians) in Brazil.</li> </ul>	<ul style="list-style-type: none"> <li>• Changing of dietary and cultural patterns in indigenous of the upper Xingu because of the contact with non-indigenous people in the country.</li> <li>• Geographical distance.</li> <li>• Language barriers.</li> </ul>	<ul style="list-style-type: none"> <li>• To incorporate indigenous health agents in the oral health promotion: supervision of tooth brushing and oral health education in schools and in the community.</li> <li>• To program visits to the community for dental treatment (fillings, extractions) in a regular way: every 4 months.</li> </ul>

<b>Oral health programme</b>	<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>	<b>Suggested recommendations</b>
<p>Oral health promotion and care programme in indigenous children of Grau, Antabambas and Cotabambas in Apurimac-Peru<sup>20</sup></p>	<ul style="list-style-type: none"> <li>• The participation of teachers, dentists and health workers in the programme.</li> <li>• Parents, teachers and children had high interest in the project.</li> <li>• The provision of ART courses for local dentists and the implementation of ART as part of the dental services of the Regional health authority (DIRESA).</li> <li>• Training health workers in oral urgent treatment.</li> <li>• Provision of adequate dental equipment and materials for implementing ART.</li> <li>• Teachers were trained in basic knowledge of oral health and preventive measures.</li> <li>• Provision of tooth brushes, tooth paste and the development of dental educational material.</li> <li>• The provision of dental care and prevention activities: sealants, fluoride varnish, fillings and ART.</li> <li>• Evaluation and monitor system of the activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of regular supervision of the trained health workers by the dentist in charge because of workload and time constrains of the dentist and transport and financial barriers.</li> <li>• Problems in documentation of the dental attention and monitoring.</li> <li>• Work done by dentists (fillings) was not sufficient (no good quality).</li> </ul>	<ul style="list-style-type: none"> <li>• The financial and material support of the Dutch NGO DHIN (Dental health international Netherlands) and ZME (Zahnmedizinische Entwicklungshilfe).</li> <li>• Support of the regional health authority of Apurimac (DIRESA).</li> </ul>	<ul style="list-style-type: none"> <li>• The national health insurance system (SIS) does not pay for ART fillings done by dentists in their rural health posts and schools, just in health centers; therefore children would have to pay for this treatment.</li> <li>• Lack of donors in provision of tooth brushes and tooth paste.</li> </ul>	<ul style="list-style-type: none"> <li>• Training teachers in oral preventive measures and health workers in oral urgent treatment.</li> <li>• Training dentists and health workers in application of ART.</li> <li>• Provision of dental care and prevention activities.</li> <li>• Evaluation and monitor system of the activities.</li> <li>• Regular supervision of trained health workers.</li> </ul>

<b>Oral health programme</b>	<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>	<b>Suggested recommendations</b>
<p>A mobile dental system in South Africa <sup>43</sup></p>	<ul style="list-style-type: none"> <li>• The mobile dental system provided comprehensive oral care and oral health education for communities and schools with limited or no access to dental services.</li> <li>• The mobile dental unit (MDU) consisted of four fully equipped dental clinics and it was operated by a team of oral health workers (a dentist, two dental therapists, a dental assistant and support staff).</li> <li>• The MDU can remain in one community for several weeks and then moved to another increasing access for those dentally underserved communities.</li> <li>• The introduction of ART in the programme increased restorative care in children, reduced extraction, made the program less threatening and more preventive and patient-friendly.</li> </ul>	<ul style="list-style-type: none"> <li>• Dental services can only be offered for 4 or 5 hours per day due to the long hours that oral health workers spend traveling to different communities.</li> <li>• Limitation in the use of ART approach: primary molars and permanent posterior teeth with one surface cavity without exposed or infected pulp.</li> </ul>	<ul style="list-style-type: none"> <li>• The program was managed by the Department of Community dentistry from the University of the Witwatersrand.</li> </ul>	<ul style="list-style-type: none"> <li>• Long distances from communities to the University where the MDU had to be translated every day.</li> </ul>	<ul style="list-style-type: none"> <li>• The use of a mobile dental unit (MDU) operated by dentists.</li> <li>• The introduction of ART (Atraumatic restorative treatment) approach to the oral health programme.</li> </ul>

<b>Oral health programme</b>	<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>	<b>Suggested recommendations</b>
<p>Community care model for oral health in Thailand <sup>44</sup></p>	<ul style="list-style-type: none"> <li>• Community participation in planning and implementation of the programme: training and discussion with teachers and health care volunteers, agreement on financing and arrangement group travel of people to the oral health center to receive treatment.</li> <li>• The establishment of an oral health restorative center into the existing health service infrastructure.</li> <li>• Villagers were training on examination by health personnel, education by schoolteachers and dental scaling by village scalers.</li> <li>• Instruction of all health personnel, teachers and senior students in the recognition, prevention and control of oral diseases.</li> <li>• Emphasis on oral health promotion and prevention.</li> <li>• Evaluation of the program in cost-effectiveness and in dental health improvements.</li> </ul>	<ul style="list-style-type: none"> <li>• The evaluation process had some difficulties of data collection, time to evaluation and interpretation of the data in future planning.</li> <li>• Logistic, financial and organizational difficulties in the implementation of the program.</li> <li>• Dental health (caries, oral hygiene and gingival health) was evaluated every five years.</li> </ul>	<ul style="list-style-type: none"> <li>• High Interest of villagers, teachers and health workers in the development of the oral health program.</li> </ul>	<ul style="list-style-type: none"> <li>• The restriction of the programme to one village (Chiangmai)</li> <li>• Distance of the oral health restorative center to the village.</li> </ul>	<ul style="list-style-type: none"> <li>• Community participation in planning and implementation of the oral health programme.</li> <li>• Train villagers in imparting oral health education.</li> <li>• Instruction of health personnel and teachers in the recognition, prevention and control of oral diseases.</li> <li>• Emphasis on oral health promotion and prevention.</li> <li>• Evaluation of the programme.</li> </ul>

## **Annex 6: Criteria for developing oral health strategies**

- **Empowering:** Oral health strategies should enable individuals and communities to assume more power over the personal, socioeconomic and environmental factors that affect their oral health.
- **Participatory:** Oral health professionals should encourage the active involvement of key stakeholders in the planning, implementation and evaluation of oral health strategies.
- **Holistic:** Oral health initiatives should foster physical, mental and social health, and focus upon the common risks and conditions that influence both general and oral health.
- **Intersectoral:** Oral health professionals should collaborate with the relevant agencies and sectors to place oral health upon a wider agenda for change.
- **Equity:** Oral health policies should be guided by a concern for equity and social justice and should ensure that inequalities in oral health are addressed where possible.
- **Evidence base:** Oral health interventions should be developed on the basis of existing knowledge of effectiveness and good practice.
- **Sustainable:** Oral health policies should bring about changes that individuals and communities can maintain and sustain once initial funding has ended.
- **Multi-strategy:** Oral health strategies should use a combination of approaches, including policy development, organizational change, community development, legislation, advocacy, education and communication to promote improvements in oral health.
- **Evaluation:** Sufficient resources and appropriate methods should be directed towards the evaluation and monitoring of oral health strategies. Both process and outcome evaluation measures should be used.

**Based on WHO guidance in the development and evaluation of public health policy (Copenhagen, 1998) <sup>30, 31</sup>**

### Annex 7: Preliminary plan of activities for Quechua indigenous people of Challhuahuacho

Objective	Activities	Planned targets	Key stakeholders
1. To increase knowledge about oral health diseases and prevention	<ul style="list-style-type: none"> <li>• Instruction of health promoters, health personnel, school teachers and community health workers in oral health promotion and prevention of oral health diseases</li> <li>• Provision of tooth brushes and tooth paste</li> </ul>	<ul style="list-style-type: none"> <li>• 2 seminars of oral health promotion</li> <li>• Tooth brushing education in schools and in the community every month</li> <li>• Distribute tooth brushes and pastes to children of the 2 schools</li> </ul>	<ul style="list-style-type: none"> <li>• MINSA</li> <li>• Teachers</li> <li>• Community assembly</li> <li>• Health workers</li> <li>• Donors</li> </ul>
2. To assume responsibilities over the fluoride exposure	<ul style="list-style-type: none"> <li>• Training oral health promoters and health personnel in application of Fluoride gel and fluoride rinsing in children</li> </ul>	<ul style="list-style-type: none"> <li>• 1 course training</li> <li>• Campaign of Fluoride gel application in schools and health posts every 6 months</li> </ul>	<ul style="list-style-type: none"> <li>• DIRESA</li> <li>• MINSA</li> <li>• Teachers</li> <li>• Health workers</li> </ul>
3. To build capacity of the Dental care system	<ul style="list-style-type: none"> <li>• Training oral health promoters and health personnel in ART technique.</li> <li>• Course recognition of dental problems and referral of patients to the oral health care center</li> <li>• Application of ART in children at schools and health post</li> </ul>	<ul style="list-style-type: none"> <li>• 2 courses of ART</li> <li>• Application of ART every 4 months</li> <li>• 1 course of dental diseases recognition for health workers and oral health promoters</li> </ul>	<ul style="list-style-type: none"> <li>• MINSA</li> <li>• Local government</li> <li>• DIRESA</li> <li>• Health workers</li> <li>• Teachers</li> <li>• Mining company</li> </ul>
4. To consider oral health into general health	<ul style="list-style-type: none"> <li>• Integration of oral health programme into general health promotion activities</li> </ul>	<ul style="list-style-type: none"> <li>• Antenatal oral health care sessions</li> <li>• Parents information of oral health in vaccination campaigns</li> <li>• Include the importance of oral health into noncommunicable diseases prevention in health posts</li> </ul>	<ul style="list-style-type: none"> <li>• MINSA</li> <li>• DIRESA</li> <li>• Health workers</li> <li>• APAFA</li> <li>• Mothers club</li> </ul>
5. To create policies to improve people's oral health	<ul style="list-style-type: none"> <li>• To create policies in schools to include tooth brushing education as part of the curricula and healthy snacks policies</li> <li>• To create policy that enable health workers and oral health promoters to participate in the rising fluoridation campaigns in schools</li> </ul>	<ul style="list-style-type: none"> <li>• Developing of policy papers</li> <li>• Meeting with stakeholders</li> <li>• Implementation of policies</li> </ul>	<ul style="list-style-type: none"> <li>• Ministry of education</li> <li>• MINSA</li> <li>• APAFA</li> <li>• DIRESA</li> <li>• Teachers</li> </ul>



6. To reduce cultural and language barriers	<ul style="list-style-type: none"> <li>To hire dentists and assistants with indigenous background to be part of the oral health programme</li> </ul>	<ul style="list-style-type: none"> <li>At least 1 dentist and 1 dental assistant of the area should be incorporated in the programme</li> </ul>	<ul style="list-style-type: none"> <li>Mining company</li> <li>Proinversion</li> <li>Community assembly</li> </ul>
7. To reduce geographical barriers	<ul style="list-style-type: none"> <li>To provide a mobile dental unit to the oral health programme</li> </ul>	<ul style="list-style-type: none"> <li>1 mobile dental unit</li> </ul>	<ul style="list-style-type: none"> <li>Mining company</li> <li>Proinversion</li> <li>Donors</li> </ul>
8. To improve quality of dental care services	<ul style="list-style-type: none"> <li>Training health workers in quality of dental care</li> <li>Bringing adequate incentives to health workers and health promoters participating in the oral health programme</li> <li>Organising schedule appointments</li> <li>Provision of dental materials and instruments and x rays equipment</li> </ul>	<ul style="list-style-type: none"> <li>2 course training</li> <li>Planning work incentives</li> <li>Schedule appointments during visits of dentists</li> <li>Provision of dental materials (amalgam, anesthetics, etc), dental instruments and x ray equipment</li> </ul>	<ul style="list-style-type: none"> <li>MINSA</li> <li>Mining company</li> <li>Proinversion</li> <li>Community assembly</li> <li>Donors</li> </ul>
9. To relief dental pain and dental emergencies	<ul style="list-style-type: none"> <li>The provision of emergency dental treatment (fillings and extractions)</li> </ul>	<ul style="list-style-type: none"> <li>Programming visits of dentists every 4 months to provide fillings and extractions in the dental unit of the mining company</li> </ul>	<ul style="list-style-type: none"> <li>Mining company</li> <li>Donors</li> <li>Community assembly</li> </ul>
10. To develop an agreement between local universities and the oral health programme	<ul style="list-style-type: none"> <li>Agreement with local universities to send voluntary dental students to collaborate with the oral health programme as part of their curricula</li> </ul>	<ul style="list-style-type: none"> <li>Provision of at least 3 dental students every 4 months</li> </ul>	<ul style="list-style-type: none"> <li>Local universities of dentistry</li> <li>Mining company</li> <li>Donors</li> </ul>
11. To establish an evaluation and monitoring system	<ul style="list-style-type: none"> <li>Monitoring of activities (training, ART, fluoride gel application, curative treatment) by dentists and health workers</li> <li>Evaluation of the programme every year</li> </ul>	<ul style="list-style-type: none"> <li>Filling forms by dentists and health workers to monitor activities</li> <li>Using qualitative and quantitative methods to evaluate the programme by a research team</li> </ul>	<ul style="list-style-type: none"> <li>DIRESA</li> <li>MINSA</li> <li>Mining company</li> <li>Local leaders</li> </ul>