THE EVALUATION OF THE LAB OF CHRONIC CONDITIONS CARE (LIACC) IN THE MUNICIPALITY OF SANTO ANTÔNIO DO MONTE, BRAZIL

Preliminary Version

(Please do not quote)

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Abstract

The aim of this study is evaluate the LIACC implementation in Santo Antônio do Monte (MG). The LIACC predicts the construction of a primary attention network in order to strength the integration between the primary and secondary health care services. Its actions should include household registration by the FHS, identification of family risk factors, individuals risk stratification and longitudinal care. The evaluation is based on household surveys that investigated the healthcare access and health status for the whole population and target groups (individuals with diabetes, hypertension, pregnant women and children under two years old) before and after the intervention.

Key words: Primary Health Care; LIACC, Chronic Conditions

Área Tematica: Politicas Públicas

1 – INTRODUCTION

Brazil has experienced great advances in the last two decades in developing the public healthcare system. After the creation of the Unified Health System (Sistema Único de Saúde - SUS) in 1988 several policies have been implemented in order to guarantee a more equiTable access to the health services (VICTORA et al., 2011; PAIM et al., 2011; MEDICI, 2011). Since then, improvements in the access to healthcare, mainly primary and emergency care, were achieved (MEDICI, 2011). According to recent studies, the coverage of primary care increased in the last years, particularly among the lowest socioeconomic groups. As a result, reduction of inequalities has been empirically observed (ANDRADE et al., 2013; PORTO et al., 2011).

The main institutional reform observed in the SUS have been related to primary and preventive care, including the Family Health Strategy (FHS). It represents an important change in the Brazilian Healthcare System wherein the emphasis of care has shifted from a curative to a preventive perspective (FUHRMANN, 2006; LENTSCK, 2010; BRASIL, 2006). The FHS has been one of the most important efforts in expanding primary care and improving the access to the public health sector. Even though the use of technology of care is widespread in developed countries, in Brazil, this experience is recent and it can be considered as an innovation in the management of primary care. FHS has played an important role in the prevention of diseases and health awareness since it constantly monitors families through systematic household visits.

According to this strategy, families are the focus of public health policies. Such policies should cover primary care for all population groups, from the newborn to the elderly individuals, irrespectively their health conditions. The Family Health Teams (FHT) are mainly composed by a family physician, a nurse, a nursing assistant and at least 4-12 community health agents (CHA). They must be able to detect symptoms of disease, necessity of continued care and to refer individuals to the needed care acting as the gateway to the public health system (BRANDÃO et al., 2011; CONILL, 2008; FERTONANI et al.,2015a).

In addition, health promotion and disease prevention activities are stimulated, such as encouraging child immunization, antenatal care, and special care to individuals who suffer from diabetes, hypertension or coronary diseases. Personal and household hygiene advices are also provided by the CHA in order to prevent and control infectious diseases especially those caused by vector-borne viruses and bacteria (BRASIL, 2006; CORBO; MOROSINI, 2005).

Empirical evidence has already been raised about the recent improvement observed in the access to healthcare mainly due to FHS coverage (MEDICI, 2011; COUTOLENC;

DMYTRACZENKO, 2013). These findings are especially true among uninsured individuals that suggest an increase in the access to the public health sector. According to recent studies, the coverage of primary care enlarged in the last years, particularly among the lowest socioeconomic groups. As a result, reduction of inequalities has been empirically observed (ANDRADE et al., 2013; PORTO et al., 2011; BRANDÃO et al., 2011; ESCOREL, 2007).

Despite these advances, some challenges still need to be addressed such as the building of healthcare networks organized to provide an integral health care. The horizontal and vertical integration between the primary and secondary or tertiary care are still frail. At least two main obstacles have to be overcame in order to develop this healthcare network. First, it is imperative to develop an information system that register all records regarding patient's healthcare utilization. Second, there is still shortage of secondary care providers in the majority of the Brazilian municipalities. Both improvements are especially important to allow the FHT to follow and monitor their patients (COUTOLENC; DMYTRACZENKO, 2013).

In the context of higher prevalence of chronic conditions due to the aging process of the Brazilian population, the healthcare should be provided into an integrated network in which a longitudinal and integral care could be delivered. It is known that the model targeted for intervention in acute conditions is not able to sustain satisfactory health outcomes when they have to deal with chronic conditions (OMS, 2003).

The Ministry of Health has already recognized these caveats and launched SUS Healthcare Network Policy in 2010. In the scope of these changes, the Lab of Innovation in Chronic Conditions Care (Laboratório de Inovação à Atenção às Condições Crônicas - LIACC) is an innovation in the management of primary care focused on chronic conditions. In Brazil, the LIACC was implemented as a pilot project in three cities: Curitiba (2011) in the state of Paraná, Santo Antônio do Monte (2013) in Minas Gerais and Tauá (2014) in Ceará. The LIACC aims to change the management of chronic conditions, involving all health professionals of the primary and secondary care and is based on the Attention to Chronic Conditions Model (ACCM) developed by MENDES (2013).

Santo Antônio do Monte is a small municipality with a population around 26000 inhabitants and located in the West region of Minas Gerais state, Brazil. It is a high-developed municipality presenting an MHDI (Municipal Human Development Index) of 0,724 in 2010 and infant mortality of 14,8 (PNUD, 2013). The majority of its population lives in the urban area (85%), in households provided with good sanitation conditions since 97% of the whole population has access to proper disposal and treated water and 85% has access to sewage. In 2012, 91,72% of its whole population was covered by FHS that were provided by eight FHT located in eight Health Units (HU), six in the

urban area and two in the rural. Addition to HU, supply of health care in the municipality also included a secondary care facility specialized to provide care to chronic conditions such as hypertension, diabetes and pregnant women, a hospital with around 50 beds and a clinical analysis laboratory able to deliver basic tests.

In Santo Antônio do Monte, the intervention occurred from June 2013 to December 2014 and focused on four target groups: individuals with diabetes, hypertension, pregnant women and children under two years old. Beyond the intervention, an impact evaluation of the LIACC is being conducted. The aim of this paper is to present the first part of the results of this evaluation. The present analysis is based on household surveys that investigated the healthcare access and health status for the whole population and target groups before and after the intervention.

2 – THE LIACC IN SANTO ANTÔNIO DO MONTE AND THE IMPACT EVALUATION

The LIACC was developeda partnership among Pan-American Health Organization/World Health Organization, Government of the State of Minas Gerais, Government of Santo Antônio do Monte and Brazilian Ministry of Health. The conceptual framework of LIACC is the Attention to Chronic Conditions Model (ACCM) developed by MENDES (2013) to the Brazilian context. The MENDES model includes components of the Chronic Care Model – CCM (WAGNER, 2008), the Kaiser Pyramid Model (PORTER; KELLOGG; 2008) and the Social Model of Health (DAHLGREN; WHITEHEAD, 1991).

The LIACC aims to change the primary health care (PHC) management of four chronic conditions (hypertension, diabetes, pregnant women and children under two years old) involving all health professionals of the primary and secondary care network. The LIACC predicts the construction of a primary attention network in order to strength the integration between the primary and secondary health care services. The health care actions under LIACC should include household registration by the FHT, identification of family risk factors, individuals risk stratification based on their chronic conditions, and longitudinal care.

The LIACC was implemented in Santo Antônio do Monte from June 2013 to December 2014 in all Health Units of the municipality. In this period, the main technologies of the LIACC were introduced to the FHT such as professional training and development of protocols in primary care. However, the technologies related to self-care and electronic medical records have not been implemented.

The impact evaluation of the LIACC will be based on a comparison of two cross-sectional analysis conducted in Santo Antônio do Monte before (2012) and after (2014) the intervention. Political and ethical reasons avoided to perform a *control-treatment* evaluation. From a political point of view, it is difficult to obtain membership of a group of municipalities only to provide information to support the comparison. In order to overcome this caveat, several sources of information were used to conduct the impact evaluation. These sources are complementary and allow a more accurate analysis of the effect associated to the intervention. The following information were investigated (FIG 1): (1) Household surveys, conducted before and after the intervention, representative for the whole population and the target groups; (2) Focal groups conducted with primary and secondary health professionals before and after the intervention; (3) Administrative records from Inpatient Care Information System available at Brazilian Health Ministry website (DATASUS); (4) Records from Deaths Information System available at Brazilian Health Ministry website (DATASUS); (5) Clinical records of the Emergency Health Unit; (6) Medical records from Health Units and from the Secondary Care Center (Hiperdia). (7) Administrative records provided by the Municipal Secretary of Health related to household FHS registration, the family risk classification as well as administrative records of the municipal clinical analysis laboratory.

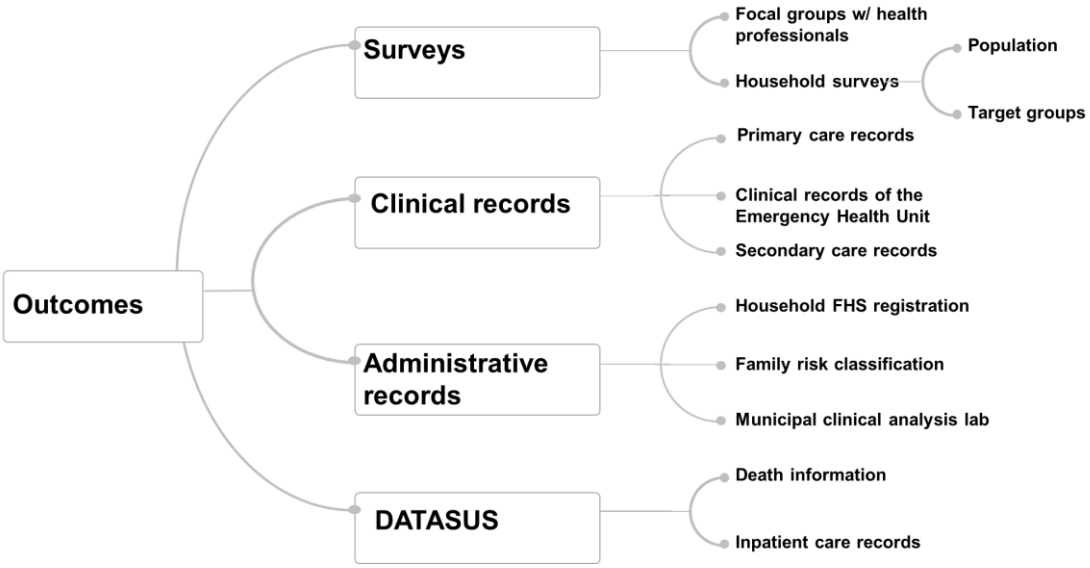

FIG 1 - Data sources descriptive Chart related to the health LIACC Implementation Evaluation Research outcomes in Santo Antônio do Monte

This paper focused on the first part of the evaluation that comprises the analysis of the results of the household surveys.

3 – METHOD

3.1 – DATA

Data came from two household surveys carried out in 2013 (reference period is 2012) and 2015 (reference period is 2014) in Santo Antônio do Monte. The aim of both surveys is to provide information about health status and health care utilization before and after the LIACC's intervention (2013). The sample is representative for the whole population and for each target group. Regarding the whole population survey, its sample is probabilistic at the census sectors level presenting representativeness for the adult population aged between 18 and 65 years old with a margin of error equal to 4%. The sample was stratified by Health Units (HU) and individuals were selected on the basis of quota sampling by age and sex. In total, 596 individuals were interviewed in the baseline (2013) and 625 in the second round (2015), after intervention. Individuals provided information about household characteristics, socioeconomic status, health status, lifestyle, and health care access and utilization. As the Brazilian system is mixed, information about private health insurance and utilization in public health care facilities were investigated.

Four target groups were investigated: i) pregnant women ii) children under 02 years old, iii) individuals with hypertension and iv) individuals with diabetes. Pregnant women comprised those who had completed their pregnancy with a live birth between January of 2011 and December of 2012 (first round) and between January of 2014 and December of 2014 (second round). This definition guaranteed that information was collected throughout all the pregnancy period that occurred before and after the implementation of LIACC. The final sample consists of 336 women/children (183 in 2013 and 155 in 2015), 744 individuals with hypertension (365 in 2013 and 379 in 2015) and 629 individuals with diabetes (312 in 2013 and 317 in 2015). Specific instruments were defined for each target group including information about health status and health care access specifically related to the chronic condition including preventive tests. Individuals of each target group also answered questions of the instrument applied to the whole population. Table 1 presents the distribution of age and sex for each target group investigated.

Table 1 - Distribution by age and sex for the whole population, individuals with hypertension, individuals with diabetes and pregnant woman

	2012		2014	
	n	%	N	%
Whole population				
Proportion of women	293	49,16	307	49,12
18 to 24 years old	97	16,28	108	17,28
25 to 34 years old	147	24,66	145	23,20
35 to 44 years old	135	22,65	136	21,76
45 to 54 years old	115	19,30	110	17,60
55 to 64 years old	68	11,41	78	12,48
65 to 75 years old	34	5,70	48	7,68
Total	596	100,00	625	100,00
Hypertesion				
Proportion of women	206	56,44	236	62,27
Less than 40 years old	50	13,70	61	16,09
40 to 49 years old	89	24,38	68	17,94
50 to 59 years old	88	24,11	114	30,08
60 years old or more	138	37,81	136	35,88
Total	365	100,00	379	100,00
Diabetes				
Proportion of women	202	64,74	201	63,41
Less than 40 years old	29	9,29	28	8,83
40 to 49 years old	39	12,50	45	14,20
50 to 59 years old	72	23,08	76	23,97
60 years old or more	172	55,13	168	53,00
Total	312	100,00	317	100,00
Pregnant women				
Less than 19 years old	27	14,75	26	16,99
20 to 24 years old	61	33,33	37	24,18
25 to 29 years old	41	22,40	44	28,76
30 to 34 years old	37	20,22	37	24,18
35 years old or more	17	9,29	9	5,88
Total	183	100,00	153	100,00

Source: SAMONTE Research, 2013 e 2015.

3.2 – STATISTICAL ANALYSIS

Data analysis included two procedures. First, a descriptive statistics including all outcome variables investigated for each target group. Second, the effect of LIACC was tested by using a logistic analysis that allowed checking if there were changes in the outcome indicators after the implementation of the LIACC. The dependent variables of the models are dummies for each outcome indicator which were defined for the whole population and for each target group. The goodness of fit

is analyzed using Pseudo-R2 statistics. Table 2 displays the outcome variables used in the analysis performed for the whole population, individuals with diabetes and hypertension. These variables concerns health care utilization.

Table 2 - Outcome variables – Population, individuals with hypertension and with diabetes

Variables	Whole population	Target Groups	
		Hypertension	Diabetes
Community Health Agent (CHA) visit	X	X	X
FHS coverage	X	X	X
Used the SUS health services	X	X	X
Outpatient care (at least one physician visit)	X	X	X
Inpatient care (excluding pregnancy and childbirth)	X	X	X
Continuous-use medication	X	X	X
More than 5 continuous-use drugs (poly drug use)	X	X	X
Hypertension continuous medication		X	
Diabetes continuous medication			X
Cholesterol test		X	X
Creatinine test		X	X
Eye fundus examination		X	X
Electrocardiogram		X	X
Blood test			X
Glycated hemoglobin			X
Glycemic test			X

For pregnant women outcome variables investigated are related to antenatal care and mother-craft. The prenatal care encompasses wide spectrum of clinical procedures and pregnant women care in an integrated manner to improve maternal health and child health. Ten outcome variables were used in the prenatal care analysis: (1) if the pregnant woman received at least one antenatal care visit; (2) if the pregnant woman received at least 6 antenatal care visits (as preconized by the Brazilian Health Ministry); (3) late prenatal care, that is, started after the third month of pregnancy; (4) pregnant woman immunization (hepatitis B, tetanus and influenza); (6) preterm birth; (5) normal delivery; (6) low birth weight (below 2.500 kg); (7) antenatal care tests (blood test, toxoplasmosis, urine, HIV/Syphilis, Glycemia after Dextrosol and Ultrasound); (8) antenatal care tests provided by SUS.

Besides that, six outcome variables were used in the mother-craft analysis: (1) children that received newborn screening; (2) children that received newborn hearing screening; (3) children that received CHA visit 48 hours after the birth; (4) children that did at least one medical check-up in the first year of life; (5) children that followed up with the pediatrician and (6) breastfeed.

Independent variables

The impact evaluation is based on a comparison of two cross-sections analysis carried out in 2012 and 2014, before and after the intervention respectively. Therefore, a dummy variable was defined to indicate the year of analysis. It is equal to 1 if the information is for 2014 and zero if 2012. Control variables included in the estimation of the logistic models are displayed in the Table 3. For preterm birth and low birth weight logistic models, multiple pregnancy indicator was also included as a control variable.

Table 3 - Control variables included in the analysis

Control Variables	Whole Population	Target groups		
		Hypertension	Diabetes	Pregnant Women
Age group	X	X	X	X
Sex	X	X	X	
Schooling level	X	X	X	
Socioeconomic Class	X	X	X	X
Household situation (rural/ urban)	X	X	X	X
Private health insurance	X	X	X	X
Insulin use			x	
Self-reported general health	X	X	X	
Hypertension	X		X	
Diabetes	X			
Antenatal care monitored by FHS				X

The education level is classified into four categories: (1) illiterate or never attended school; (2) at least one grade of primary school; (3) at least one grade of junior high school and (4) Incomplete high school or more. Socioeconomic class is a categorical variable defined by the Associação Brasileira de Empresas de Pesquisa – ABEP (BRASIL, 2015). This criterion classifies the population according to possession of household goods, number of domestic employees, and the highest educational level in the household. A wealth index was built for each household, ranging from 0 to 46 that allow us to classify households into three socioeconomic classes: A-B, C, and D/E.

The self-reported health state is a global health indicator by which individuals assess their health status. In this paper, the sample was classified in three categories according to this variable: (1) very bad/bad; (2) regular and (3) very good/good.

4 – RESULTS

4.1 – DESCRIPTIVE ANALYSIS

Whole Population

Table 4 presents the descriptive statistics concerning outcome variables for the survey in 2012 and 2014. FHS coverage is almost universal in Santo Antônio do Monte. In 2012, 98% of individuals declared that household was registered in FHS while 91% reported that their household received at

least one CHA visit in the reference year. In 2014, these percentages were even higher, 99% and 91%, respectively, being these differences statistically significant. More than 90% of the individuals reported to use the public health services in Santo Antônio do Monte both in 2012 as in 2014. Moreover, among those who reported having had at least one doctor visit in the reference year, around 68% received this care in public facilities. Considering only the population without private health insurance, this percentage is even higher reaching more than 80%. The percentage of individuals that had at least one hospital admission remains constant over time, about 8%.

Around 78% of individuals in 2012 and 73% in 2014 reported having good or very good health status. Regarding the use of continuous medication, a significant increase in the proportion of individuals who take more than five medicines (Polypharmacy) was observed. While in 2012, 12% of the individuals declared to take more than five medications, in 2014, this percentage increased to 22%.

Table 4 – Access indicators, utilization and health status, by reference year - Whole population, Santo Antônio do Monte, 2012 and 2014

	2012		2014		Test comparing the years (t-test)	
	n	%	N	%	p-value	Sig
Access to health care services						
Private health insurance	184	30.87	190	30.5	0.8873	NS
Used the SUS health services	554	92.95	571	91.36	0.3016	NS
Community Health Agent visit (CHA visit)	532	90.94	588	94.99	0.0058	***
FHS coverage	583	97.82	617	99.04	0.0862	*
Did at least one doctor visit in the reference year	390	66.9	418	67.31	0.8783	NS
Did at least one doctor visit in SUS (given that consulted)	265	68.48	287	68.66	0.9551	NS
Did at least one doctor visit in SUS (given that consulted – only people without private health insurance)	200	81.3	228	82.31	0.7655	NS
Hospital admisson	46	7.9	48	8	0.9513	NS
Health status						
Continuous-use medication	231	38.76	251	40.16	0.6168	NS
Polypharmacy	28	12.12	57	22.71	0.0023	***
Self-reported health status (good/very good)	465	78.02	456	72.96	0.0366	**
Diabetes	27	4.53	59	9.44	0.0008	***
Hypertension	158	26.55	173	27.72	0.6466	NS
TOTAL	596	100	625	100		

Note 1: 2 cases for socioeconomic class, 17 cases for HCA visit, 2 cases for FHS coverage, 17 cases for medical appointment, 3 cases for medical appointment in SUS, 2 cases for hospitalization and 2 cases for hypertension were omitted (NS/NR). Note 2: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE Research, 2013 e 2015.

Related to the prevalence of chronic diseases, the proportion of individuals who declared having hypertension remains almost constant over time (27% in 2012 and 28% in 2014), but there is a significant increase in the proportion of individuals that declared having diabetes (4.53% to 9.44%). This result may be associated to the risk stratification process by which the population was exposed during the LIACC, and therefore more people could be diagnosed with diabetes.

Hypertension

This subsection describes main results found for individuals that declared having hypertension. FHS coverage was almost universal for this target group, 99% in the two years. Besides, the percentage of those who received at least one CHA visit in the reference year also increased significantly between 2012 and 2014, from 90% to almost 95%. In contrast, the percentage of individuals with hypertension that use SUS services decreased from 99% in 2012 to 96% in 2014, and this reduction is statistically significant. However, the use of public services is too high considering that more than 30% of those individuals had private health insurance.

The high proportion of individuals receiving doctor visits through public system is another indicator of the importance of public health care system in this municipality. More than 80% of individuals with hypertension reported that received at least one doctor visit in both years, and among them around 65% was using the SUS. Considering only those without private health insurance, this percentage is even higher (around 80%).

In relation to the preventive tests, there were no statistically significant changes between 2012 and 2014. The percentage of people that did at least one cholesterol test and at least one creatinine test is not universal, though more than 60% did these tests. For electrocardiogram and eye fundus examination, these numbers were around 40% and 30%, respectively.

The majority of individuals with hypertension uses continuous medication (about 93%) and among them, in 2012, 14% were poly use drugs while in 2014, this percentage significantly increased to 22%. Specifically related to medications for hypertension control, the percentage of individuals that correctly use medications, that is, on a daily basis, decreased from 85% in 2012 to 77% in 2014.

Table 5 - Access indicators, utilization and health status, by year reference – People with hypertension, Santo Antônio do Monte, 2012 and 2014

	2012		2014		Test comparing the years (t-test)	
	n	%	N	%	p-value	Sig
Access to health services						
Private Health insurance	142	38.9	146	38.52	0.9150	NS
Used the SUS health services	360	98.63	364	96.04	0.0291	**
Health Community Agent visit (HCA visit)	327	90.08	359	94.97	0.0111	**
FHS coverage	360	98.63	378	99.74	0.0920	*
Did at least one doctor visit	303	85.11	305	81.12	0.1502	NS
Did at least one doctor visit in SUS (given that consulted)	207	68.54	199	65.25	0.3890	NS
Did at least one doctor visit in SUS (given that consulted – only people without private health insurance)	144	82.29	141	77.9	0.3019	NS
Hospitalization admisson	53	14.8	41	11.11	0.1382	NS
Electrocardiogram	174	48.07	173	45.77	0.5316	NS
Cholesterol test	259	71.35	281	74.73	0.3005	NS
Eye fundus examination	113	31.22	128	33.77	0.4582	NS
Creatinine test	213	60.34	215	59.89	0.9023	NS
Health status						
Continuous medication	338	92.6	358	94.46	0.3035	NS
Polypharmacy	49	14.5	77	21.51	0.0163	**
Hypertension continuous medication					0.0028	***
Does not use	40	10.96	78	20.58		
Correct use (every day)	309	84.66	290	76.52		
Incorrect use (not every day)	16	4.38	11	2.9		
Self-reported in healthy state (good/very good)	214	58.63	225	59.37	0.7162	NS
TOTAL	365	100	379	100		

Note: 3 cases for HCA visit, 12 cases for medical appointment, 1 case for medical appointment I SUS, 2 cases for hospitalization, 4 cases for electrocardiogram, 5 cases for cholesterol test, 3 cases for eye fundus test, 32 cases for creatinine test and (NS/NR). Note 2: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE Research, 2013 e 2015.

Diabetes

The FHS coverage is universal among individuals with diabetes. Additionally, the percentage of those receiving at least one CHA visit in the reference year is quite high, (95%) remaining sTable across the two years. As observed for individuals with hypertension, the percentage of people with diabetes who use SUS services is really high, 99%, evidencing the importance of public services in Brazil for these population groups in medium-sized municipalities.

Table 6 - Access indicators, utilization and health status, by year reference – People with diabetes, Santo Antônio do Monte, 2012 and 2014

	2012		2014		Test comparing the years (t-test)	
	N	%	N	%	p-value	Sig
Access to health services						
Private health insurance	107	34.41	108	34.07	0.9295	NS
Used the SUS health services	310	99.36	309	97.78	0.0973	*
Community Health Agent (CHA visit)	294	94.53	299	94.62	0.9619	NS
FHS coverage	312	100	316	99.68	0.3215	NS
Did at least one doctor visit	291	95.1	278	89.39	0.0081	***
Did at least one doctor visit in SUS (given that consulted)	216	74.23	219	78.78	0.2017	NS
Did at least one doctor visit in SUS (given that consulted – only people without Private health insurance)	157	80.93	157	86.26	0.1644	NS
Hospital admisson	61	19.74	54	17.25	0.4249	NS
Feet test	164	52.73	162	51.43	0.7444	NS
Glycemia control (finger test)	243	77.88	242	77.23	0.6977	NS
Cholesterol test	284	91.32	261	83.65	0.0038	***
Eye fundus test	146	47.4	150	47.47	0.9869	NS
Blood test	276	92	270	89.4	0.2736	NS
Glycated hemoglobin test	220	80.59	172	70.49	0.0074	***
Creatinine test	236	80	212	71.86	0.0208	**
Electrocardiogram	185	61.67	195	62.3	0.8719	NS
Health status						
Continuous medication	306	98.08	309	97.48	0.6104	NS
Polypharmacy	152	49.67	161	52.1	0.5474	NS
Diabetes continuous medication	287	91.99	261	82.33	0.0003	***
Insulin use	82	26.28	65	20.57	0.0912	*
Self-reported in healthy state (good/very good)	131	41.99	140	44.16	0.6230	NS
Hypertension	247	79.17	243	76.9	0.4933	NS
TOTAL	312	100	317	100		

Note 1: 1 case for Private health insurance, 1 case for use SUS health services, 2 cases for HCA visit, 12 cases for medical appointment, 1 case for hospitalization, 3 cases for feet test, 1 case for glycemia control, 6 cases for cholesterol test, 5 cases for eye fundus test, 27 cases for blood test, 112 cases for glycated hemoglobin test, 39 cases for creatinine test, 16 cases for electrocardiogram, 1 case for insulin use and 1 case for hypertension were omitted (NS/NR). Note 2: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE Research, 2013 e 2015.

Even though the percentage of individuals with diabetes that received at least one doctor visit in the reference year significantly decreased between 2012 and 2014, this reduction seems to occur in the private sector since the coverage of this care remains stable and high in SUS during the period. With regard to preventive tests there was a statistically significant reduction between 2012 and 2014 to the cholesterol tests, creatinine and glycated hemoglobin.

The majority of individuals with diabetes uses continuous medication and among them, half is poly use drugs. Along the period, the proportion of people who use continuous medication to control diabetes and/or insulin dropped significantly. This may indicate a greater control of blood glucose level of people with diabetes after the LIACC intervention.

Maternal and Child Health

In Santo Antônio do Monte the antenatal care is universal and FHS performs an important role since more than 70% of pregnant women were monitored by this program. For women without private health insurance, FHS coverage is even greater (more than 80%). In addition, the quality of antenatal care seems to be good: the majority (93% in 2012 and 97% in 2014) of women had at least six antenatal visits during pregnancy and a small portion received late prenatal care (after the third month). Moreover, between 2012 and 2014, it was observed a significant reduction in this last indicator, from 13% to 5%.

In relation to the prenatal tests, the coverage is also almost universal in Santo Antônio do Monte and the public system play again an important role to supply these services, especially among the women whose prenatal care was monitored by FHS.

About 95% of pregnant women were immunized against tetanus, however immunization against Hepatitis B and influenza was lower. In 2012, 66% of pregnant women were immunized against Hepatitis B and 78% were immunized against Influenza. In 2014, these figures are 73% and 75% respectively.

Table 7 - Prenatal care indicators – Pregnant woman, Santo Antônio do Monte, 2012 and 2014

	2012		**2014**		Test comparing the years (t-test)	
	n	**%**	N	%	p-value	Sig
Did antenatal monitoring	179	97.81	152	99.35	0.2493	NS
Antenatal monitoring in FHS (given that did antenatal monitoring)	130	72.63	114	75	0.6261	NS
Antenatal monitoring in FHS (given that did antenatal monitoring – only women without private health insurance)	101	80.8	84	87.5	0.1828	NS
Did at least 6 antenatal appointments (given that did antenatal monitoring)	158	93.49	144	97.3	0.1120	NS
Began the antenatal monitoring after the third month of pregnancy (late prenatal care)	23	12.92	8	5.26	0.0174	**
Diabetes during pregnancy	8	4.4	8	5.23	0.7227	NS
Hypertension during pregnancy	40	21.98	43	28.1	0.1968	NS
Hepatitis B Immunization	120	65.57	111	72.55	0.1705	NS
Influenza Immunization	142	77.6	115	75.16	0.6019	NS

Guidance in making tetanus during pregnancy	145	80.11	129	86	0.1587	NS
Took tetanus vaccine	166	94.32	140	95.89	0.5196	NS
Blood test during pregnancy						
Did	180	98.36	153	100	0.1123	NS
Did by SUS	137	76.11	99	64.71	0.0224	**
Did by SUS (for women who did antenatal monitoring in FHS)	116	89.23	94	82.46	0.1284	NS
Toxoplasmosis test during pregnancy						
Did	150	86.21	138	91.39	0.1431	NS
Did by SUS	104	69.33	89	64.49	0.3845	NS
Did by SUS (for women who did antenatal monitoring in FHS)	86	85.15	84	84	0.8227	NS
Urine test during pregnancy						
Did	178	97.27	153	100	0.0395	**
Did by SUS	131	73.6	99	64.71	0.0804	*
Did by SUS (for women who did antenatal monitoring in FHS)	115	88.46	94	82.46	0.1833	NS
HIV/syphilis test						
Did	167	93.82	146	97.33	0.1300	NS
Did by SUS	121	72.46	89	60.96	0.0309	NS
Did by SUS (for women who did antenatal monitoring in FHS)	105	86.07	87	79.82	0.2073	NS
Glycemia test (after Dextrosol)						
Did	61	34.27	93	65.96	0.0000	***
Did by SUS	35	57.38	51	54.84	0.7583	NS
Did by SUS (for women who did antenatal monitoring in FHS)	32	74.42	49	74.24	0.9838	NS
Ultrasound						
Did	182	99.45	153	100	0.3613	NS
Did by SUS	105	57.69	48	31.37	0.0000	***
Did by SUS (for women who did antenatal monitoring in FHS)	94	72.31	46	40.35	0.0000	***
TOTAL	183	100	153	100		

Note: 6 cases for did at least 6 **antenatal appointments**, 1 case for late antenatal care, 1 case for gestacional diabetes, 1 case for gestacional hypertension, 11 cases for toxoplasmosis test, 8 cases for HIV/syphlis test, 17 cases for glycemia test, 5 cases for guidance in making tetanus during pregnancy and 14 cases for took tetanus vaccine were omitted (NS/NR). Note 2: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE Research, 2013 e 2015.

Despite the outcomes observed for prenatal care, childbirth characteristics do not present a good performance. For instance, the majority of women (more than 50%) received Cesarean section (C-section) in Santo Antônio do Monte in both years. Indeed, almost 11% were low-birth-weight infants and around 27% were preterm birth. These indicators showed little variability over time except for the pre-schedule C-section births that decreased from 65% to 51%.

Related to mother-craft, there is still room for improvements. The percentage of pregnant women who received a CHA visit 48 hours after the birth was only 32% in 2012 and decreased to

28% in 2014. Despite of the improvements observed for the newborn hearing screening, which increased from 41% to 57%, the coverage is still low. On the other hand, over 96% of children had at least one routine visit in the first year of life and most (around 80%) of the mothers reported that children received pediatric follow up care.

In 2012, 91% of mothers reported having breastfed their children for at least one month, while in 2014, this percentage increased to 94%. Interestingly, the percentage of women who reported having received guidance on breastfeeding is lower than the percentage of women who said to have breastfed.

Table 8 - Childbirth and childcare indicators by Year - Santo Antônio do Monte, 2012 and 2014

	2012		2014		Test comparing the years (t-test)	
	N	%	N	%	p-value	Sig
Childbirth						
Preterm birth	48	26.23	42	27.63	0.7740	NS
Normal delivery	39	21.31	31	20.26	0.8141	NS
Pre schedule for C-section	94	65.28	62	50.82	0.0170	**
Complications in delivery	25	13.66	24	15.69	0.6017	NS
Low birthweight	21	11.67	17	10.97	0.8412	NS
Mothercraft						
% of children that received newborn screening	184	99.46	155	100	0.3608	NS
% of children that received newborn hearing screening	73	40.56	84	56.76	0.0034	***
Received CHA visit 48 hours after the birth	58	31.69	43	28.29	0.5005	NS
Received breastfeed Advice	159	87.36	127	83.01	0.2624	NS
% of children breastfeed	169	91.35	117	94.35	0.3257	NS
Did at least one medical check-up in the first year of life	179	96.76	149	96.13	0.7556	NS
Followed up with the pediatrician	145	78.8	127	82.47	0.3990	NS

Note: 1 case for premature birth, 5 cases for low birthweight, 12 cases for newborn hearing screening, 1 case for HCA visit 48 hours after the birth, 1 case for guidance to breastfeed, 31 cases for breastfeed and 2 cases for followed up with the pediatrician were omitted (NS/NR). Note 2: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE database, 2013 e 2015.

4.2 – LOGIT MODELS

Table 9 present the results for logit models estimated to analyze healthcare access for the entire population for each outcome variable except FHS coverage that was already universal. We focus our analysis on the dummy variable related to year that captures effects associated to LIACC intervention. The LIACC intervention significantly only affects CHA visit for which the chance was 90% higher in 2014 compared to 2012, suggesting a strengthening of FHS.

Similar results were also found for individuals with hypertension except for the use of medications. After the LIACC intervention the probability of receiving a CHA visit increased 113% suggesting that this chronic condition became a priority for FHT. Results for drug use are not intuitive: while the chance of taking medications to control hypertension decreased, the opposite was observed for the polypharmacy use. Regarding preventive tests, all coefficients were not significant for year dummy variable, which means that major changes were not observed in the intervention period (Table 11).

Table 9 - Odds-ratio estimated for the logit models – whole population, Santo Antônio do Monte, 2012 and 2014

	CHA VISIT		**DOCTOR VISIT**		**SUS DOCTOR VISIT**		**HOSPIT**		**CONTINUOUS MEDICINE**		POLYPHARMACY	
Year of 2014	1.90	***	0.93	NS	0.97	NS	1.03	NS	0.89	NS	1.73	*
Age group (baseline: 18 to 24 years old)												
25 to 34	1.78	NS	0.90	NS	0.88	NS	1.59	NS	1.76	*	0.06	**
35 to 44	1.29	NS	1.26	NS	0.59	NS	0.57	NS	2.05	**	0.19	*
45 to 54	1.80	NS	1.75	NS	0.51	***	0.99	NS	3.87	***	0.35	NS
55 to 64	1.38	NS	0.74	**	0.61	NS	0.84	NS	12.47	***	0.49	NS
65 to 75	2.92	NS	1.23	NS	0.61	NS	0.43	NS	9.45	***	0.85	NS
Women	0.66	**	3.10	***	1.20	NS	1.16	NS	2.54	***	1.04	NS
Private health insurance	1.72	**	1.82	***	0.20	***	1.72	**	1.16	NS	1.29	NS
Socioeconomic class (baseline: class D-E)												
Class C	1.47	NS	1.48	**	0.66	NS	1.26	NS	1.05	NS	1.37	NS
Class A-B	2.13	**	1.54	*	0.29	***	0.64	NS	1.20	NS	0.93	NS
Education (baseline: illiterate or never attended school)												
At least one grade of primary school	1.40	NS	1.27	NS	2.36	NS	0.32	***	0.76	NS	1.16	NS
At least one grade of junior high school	1.26	NS	1.19	NS	3.23	NS	0.36	**	0.64	NS	1.16	NS
Incomplete high school or more	1.55	NS	2.59	**	2.87	NS	0.30	**	0.57	NS	0.64	NS
Diabetes	1.04	NS	2.55	*	2.54	**	1.43	NS	8.02	***	3.46	***
Hypertension	0.83	NS	2.45	***	1.22	NS	2.55	***	20.89	***	3.03	***
Urban	1.41	NS	0.62	**	0.38	***	1.00	NS	0.80	NS	1.40	NS
Health state (baseline: very bad/bad)												
Regular	0.82	NS	1.22	NS	0.54	NS	0.37	**	1.52	NS	0.57	NS
Very good/Good	1.05	NS	0.69	NS	0.44	NS	0.40	**	0.71	NS	0.21	***
Constant	3.06	NS	0.59	NS	17.02	***	0.32	NS	0.13	***	0.19	NS
Number of obs	1181		1180		794		1158		1197		474	
Pseudo R2	0.0519		0.1337		0.1788		0.0774		0.4377		0.2391	
Log likelihood	-277.42		-644.32		-406.80		-298.64		-451.86		-168.49	

Note: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE database, 2013 e 2015.

Table 10 - Odds-ratio estimated for the logit models – People with hypertension, Santo Antônio do Monte, 2012 and 2014

	CHA VISIT		DOCTOR VISIT		SUS DOCTOR VISIT		HOSPIT		CONTINUOUS MEDICINE		POLYPHARMIC	
Year of 2014	2.13	**	0.74	NS	0.78	NS	0.73	NS	0.58	***	1.86	***
Age group (baseline: less than 40 years old)												
40 to 49	1.10	NS	1.05	NS	0.67	NS	1.47	NS	3.07	***	4.45	***
50 to 59	0.73	NS	0.76	NS	0.87	NS	1.31	NS	3.64	***	3.11	**
More than 60	2.00	NS	0.88	NS	0.56	*	1.38	NS	6.14	***	8.07	***
Women	1.29	NS	1.61	**	1.32	NS	1.34	NS	1.20	NS	1.70	**
Private health insurance	1.07	NS	1.73	**	0.27	***	1.18	NS	1.50	*	1.38	NS
Socioeconomic class (baseline: class D-E)												
Class C	1.21	NS	1.22	NS	0.66	NS	0.88	NS	1.09	NS	1.91	**
Class A-B	2.68	*	1.44	NS	0.45	**	0.46	*	1.75	NS	1.01	NS
Education (baseline: illiterate or never attended school)												
At least one grade of primary school	1.88	NS	1.16	NS	1.50	NS	0.69	NS	2.07	**	1.64	NS
At least one grade of junior high school	2.34	*	1.04	NS	1.98	*	0.72	NS	1.89	*	1.58	NS
Incomplete high school or more	3.75	**	1.55	NS	1.43	NS	0.91	NS	1.33	NS	1.49	NS
Urban	0.96	NS	0.63	NS	0.58	*	1.40	NS	0.84	NS	1.31	NS
Health state (baseline: very bad/bad)												
Regular	1.72	NS	1.15	NS	0.45	NS	0.61	NS	1.06	NS	0.48	*
Very good/Good	1.16	NS	0.89	NS	0.42	NS	0.40	**	1.23	NS	0.23	***
Constant	2.05	NS	4.58	**	18.03	***	0.24	**	0.71	NS	0.02	***
Number of obs	738		729		606		724		741		693	
Pseudo R2	0.0685		0.0367		0.1226		0.0363		0.0955		0.1176	
Log likelihood	-182.30		-317.17		-337.83		-269.37		-331.34		-288.59	

Note: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant.
Source: SAMONTE database, 2013 e 2015.

Table 11 - Odds-ratio estimated for the logit models for preventive tests – People with hypertension, Santo Antônio do Monte, 2012 and 2014

	CHOLESTEROL TEST		EYE FUNDUS TEST		CREATININE TEST		ECG	
Year of 2014	1.16	NS	1.18	NS	0.93	NS	0.89	NS
Age group (baseline: less than 40 years old)								
40 to 49	1.39	NS	1.40	NS	0.86	NS	0.96	NS
50 to 59	1.79	**	0.89	NS	1.18	NS	1.64	**
Over than 60	2.31	***	1.52	NS	1.41	NS	2.02	***
Women	1.33	NS	1.04	NS	1.48	**	1.06	NS
Private health insurance	2.04	***	1.97	***	2.45	***	1.43	**
Socioecnomic class (baseline: class D-E)								
Class C	1.28	NS	1.40	NS	1.07	NS	1.01	NS
Class A-B	1.88	**	1.82	**	1.36	NS	1.02	NS
Education (baseline: illiterate or never attended school)								
At least one grade of primary school	0.86	NS	1.04	NS	0.77	NS	0.74	NS
At least one grade of junior high school	0.78	NS	1.03	NS	0.70	NS	0.72	NS
Incomplete high school or more	0.99	NS	1.09	NS	1.19	NS	0.87	NS
Urban	0.64	*	0.95	NS	0.79	NS	0.75	NS
Health state (baseline: very bad/bad)								
Regular	1.76	NS	0.96	NS	1.23	NS	0.82	NS
Very good/Good	1.40	NS	0.99	NS	1.41	NS	1.09	NS
Constant	0.88	NS	0.20	***	0.78	NS	0.84	NS
Number of obs	736		738		709		737	
Pseudo R2	0.0597		0.0404		0.0651		0.0346	
Log likelihood	-402.02		-447.35		-445.49		-491.98	

Note: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant.
Source: SAMONTE database, 2013 e 2015.

Logit models for individuals with diabetes show us that during 2012-2014 period there was a decrease in the probability of receiving at least one doctor visit. However, this decrease was not found for visits received in the public system. Besides doctor visits, the only significant coefficient was found for medication to control diabetes. In this case, there was also a reduction in the chance of taking these medicines (Table 12).

The year variable was statistically significant for glycated hemoglobin, cholesterol and creatinine tests, indicating a reduction in the chance of having conducted these tests in 2014 (Table 13).

Table 12 - Odds-ratio estimated for the logit models – People with hypertension, Santo Antônio do Monte, 2012 and 2014

	CHA VISIT		DOCTOR VISIT		SUS DOCTOR VISIT		HOSPITAL ADMISSION		CONTINUOUS MEDICINE		POLYPHARMIC	
Year of 2014	0.94	NS	0.47	**	1.34	NS	0.97	NS	0.35	***	1.31	NS
Age group (baseline: less than 40 years old)												
40 to 49 years old	1.58	NS	1.20	NS	1.35	NS	0.61	NS	4.27	***	2.33	*
50 to 59 years old	2.92	NS	0.99	NS	2.03	NS	0.36	**	6.08	***	3.35	**
More than 60 years old	3.25	NS	0.79	NS	0.94	NS	0.38	**	15.07	***	4.22	***
Women	0.71	NS	1.37	NS	1.28	NS	0.92	NS	0.56	**	1.39	*
Private health insurance	1.16	NS	0.99	NS	0.39	***	1.78	**	1.18	NS	1.09	NS
Insulin	1.16	NS	1.81	NS	1.97	**	2.47	***			1.38	NS
Socioeconomic class (baseline: Class D-E)												
Class C	0.56	NS	1.72	NS	1.04	NS	0.88	NS	1.29	NS	0.80	NS
Class A-B	3.22	NS	1.39	NS	0.63	NS	0.38	**	1.54	NS	0.53	**
Education (baseline: illiterate or never attended school)												
At least one grade of primary school	3.39	***	0.43	*	1.13	NS	0.53	**	0.87	NS	0.92	NS
At least one grade of junior high school	1.76	NS	0.28	**	1.27	NS	0.52	NS	1.27	NS	0.67	NS
Incomplete high school or more	8.25	*	0.70	NS	0.78	NS	0.81	NS	0.63	NS	1.24	NS
Urban	0.72	NS	0.52	NS	0.99	NS	0.89	NS	2.72	***	1.21	NS
Hypertension	0.31	*	1.11	NS	0.66	NS	1.41	NS	0.78	NS	6.79	***
Health state (baseline: very bad)												
Regular	3.69	***	2.01	NS	0.81	NS	1.01	NS	0.56	NS	1.07	NS
Very good/Good	3.19	**	0.94	NS	1.19	NS	0.66	NS	0.48	NS	0.75	NS
Constant	6.55	NS	31.20	***	3.82	*	0.62	NS	2.36	NS	0.05	***
Number of obs	617		607		560		612		620		605	
Pseudo R2	0.1255		0.0775		0.0915		0.0804		0.1695		0.1590	
Log likelihood	-112.58		-152.56		-279.96		-269.21		-199.58		-352.60	

Note: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant.

Table 13 - Odds-ratio estimated for the logit models for preventive tests – People with diabetes, Santo Antônio do Monte, 2012 and 2014

	BLOOD TEST		GLYCATED HEMOGLOBIN		FEET TEST		GLYCEMIA		COLESTEROL		CREATININE TEST		ECG		EYE FUNDUS TEST	
Year of 2014	0.74	NS	0.54	***	1.02	NS	0.98	NS	0.50	***	0.61	**	1.03	NS	1.09	NS
Age group (baseline: less than 40 years old)																
40 to 49	4.74	**	1.69	NS	1.09	NS	3.25	***	2.67	**	1.30	NS	1.69	NS	1.48	NS
50 to 59	4.75	***	1.98	NS	1.69	NS	2.85	***	3.84	***	2.13	*	2.12	**	1.82	*
Over 60 years old	3.79	**	1.69	NS	1.59	NS	3.87	***	3.33	***	2.21	*	2.17	**	2.81	***
Women	1.11	NS	0.88	NS	1.13	NS	1.55	**	1.04	NS	1.03	NS	0.70	*	0.89	NS
Health insurence	2.52	**	1.85	**	1.09	NS	0.77	NS	2.66	***	2.31	***	1.21	NS	0.97	NS
Insulin	2.76	**	2.19	***	2.80	***	7.22	***	3.07	***	3.07	***	1.56	**	2.86	***
Socioeconomic class (baseline: class D-E)																
Class C	1.12	NS	0.72	NS	0.93	NS	1.15	NS	1.03	NS	0.61	**	1.20	NS	1.19	NS
Class A-B	1.28	NS	0.69	NS	1.39	NS	1.73	NS	1.03	NS	1.08	NS	0.89	NS	1.97	**
Education (baseline: illiterate or never attended school)																
At least one grade of primary school	0.84	NS	1.47	NS	0.74	NS	0.85	NS	1.13	NS	1.39	NS	0.83	NS	0.80	NS
At least one grade of junior high school	0.98	NS	2.29	**	0.55	*	0.57	NS	1.06	NS	1.25	NS	0.88	NS	1.19	NS
Incomplete high school or more	4.44	*	5.03	***	1.09	NS	0.72	NS	1.57	NS	3.03	**	1.23	NS	1.14	NS
Urban	0.52	NS	0.72	NS	1.21	NS	0.74	NS	0.79	NS	0.76	NS	0.56	**	0.84	NS
Hypertension	0.88	NS	1.07	NS	1.08	NS	1.02	NS	1.44	NS	1.78	**	1.94	***	0.98	NS
Health state (baseline: very bad/bad)																
Regular	1.43	NS	1.00	NS	0.92	NS	0.78	NS	0.72	NS	1.31	NS	0.95	NS	1.44	NS
Very good/Good	1.42	NS	1.06	NS	0.90	NS	0.87	NS	0.85	NS	2.05	**	0.72	NS	1.75	*
Constant	2.62	NS	1.80	NS	0.54	NS	1.16	NS	2.33	NS	0.66	NS	1.05	NS	0.24	***
Number of obs	594		510		616		619		614		582		604		614	
Pseudo R2	0.0845		0.0718		0.0535		0.0980		0.0936		0.1098		0.0477		0.0606	
Log likelihood	-169.84		-262.58		-403.71		-300.68		-208.37		-287.87		-383.56		-399.12	

Note: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE database, 2013 e 2015

Regarding antenatal care, the coverage was already universal for most of the clinical procedures even before the LIACC intervention. Therefore, logistic models were estimated only for those indicators which coverage were not universal (Table 10 and Table 11). The majority of them were related to the care received in the public health care system. According to the results, significant changes during the intervention were observed for the probability of receiving late prenatal care, having done oral glucose test with dextrosol, having done antenatal care exams funded by SUS such as blood test, urine test, HIV/Syphilis, and ultrasound. As it is noticed, the intervention contributed to decrease the chance of receiving late prenatal care and increase the probability of having done oral glucose test with dextrosol. On the other hand, the aforementioned exams provided by SUS decreased during the intervention period.

An interesting result was found for the model that estimates the chancing of having normal delivery. While the presence of private health insurance significantly reduces the chance of normal delivery, prenatal care monitored by FHS increases this chance. This finding corroborates to the empirical evidences for Brazil that also show that the proportion of normal delivery in the public health care system is higher than in the private health sector (GIGLIO et al., 2005; PUCCINI et al.,2003; YAZLLE et al., 2001; SASS, 2009).

Table 14 - Odds-ratio estimated for the logit models for pretanatal care – Pregnant woman, Santo Antônio do Monte, 2012 and 2014

	PRENATAL CARE IN FHS		LATE PRENATAL		HEPATITIS B		INFLUENZA		NORMAL BIRTH		LOW WEIGH	
Year of 2014	1.23	NS	0.35	**	1.24	NS	0.77	NS	0.98	NS	1.02	NS
Age group (baseline: less than 20 years old)												
20 to 24 years old	0.41	NS	0.46	NS	1.51	NS	3.08	***	0.85	NS	4.79	**
25 to 29 years old	0.28	**	0.77	NS	2.46	**	3.89	***	0.76	NS	2.47	NS
30 to 34 years old	0.47	NS	0.55	NS	2.86	**	3.85	***	0.58	NS	3.65	NS
More than 35 years old	0.25	**	0.51	NS	2.00	NS	5.88	***	0.99	NS	7.41	**
Private health insurance	0.41	***	0.50	NS	1.52	NS	0.99	NS	0.39	**	0.65	NS
Socioeconomic class (baseline: class D-E)												
Class C	0.15	**	0.48	NS	0.83	NS	1.35	NS	0.61	NS	1.37	NS
Class A-B	0.06	***	0.14	**	0.47	*	2.50	*	0.35	*	1.70	NS
Urban	0.20	**	1.81	NS	1.25	NS	0.57	NS	1.09	NS	0.99	NS
Prenatal care in FHS			1.10	NS	1.27	NS	1.48	NS	4.13	**	4.31	**
Twin											7.39	***
Constant	311.57	***	0.32	NS	0.94	NS	1.14	NS	0.17	**	0.01	***
Number of obs	329		328		329		329		329		328	
Pseudo R2	0.2032		0.1091		0.0361		0.0665		0.1132		0.1204	
Log Likelihood	-150.61		-91.42		-193.96		-164.86		-145.00		-101.65	

Note: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant. Source: SAMONTE database, 2013 e 2015.

Table 15 - Odds-ratio estimated for the logit models for prenatal tests – Pregnant woman, Santo Antônio do Monte, 2012 and 2014

	SUS BLOOD TEST		TOXOPLASMOSIS		SUS TOXOPLASMOSIS		SUS URINE		HIV/SYPHILIS		SUS HIV/SYPHILIS		INGESTION GLUCOSE TEST		SUS INGESTION GLUCOSE TEST		SUS ULTRASOUND	
Year of 2014	0.38	***	1.57	NS	0.62	NS	0.51	**	1.45	NS	0.42	**	3.67	***	0.81	NS	0.20	***
Age group (baseline: less than 20 years old)																		
20 to 24	0.70	NS	1.06	NS	0.47	NS	0.88	NS	3.92	NS	0.46	NS	0.75	NS	0.49	NS	0.55	NS
25 to 29	2.53	NS	1.06	NS	1.49	NS	1.96	NS	5.77	NS	0.96	NS	0.89	NS	0.32	NS	0.94	NS
30 to 34	1.29	NS	1.52	NS	0.89	NS	1.48	NS	2.30	NS	0.67	NS	1.60	NS	0.67	NS	1.44	NS
More than 35	0.68	NS	0.91	NS	0.82	NS	1.12	NS	0.26	NS	0.51	NS	1.41	NS	0.19	NS	1.34	NS
Private health insurance	0.22	***	1.01	NS	0.17	***	0.21	***	1.95	NS	0.16	***	1.42	NS	0.27	***	0.11	***
Socioeconomic class (baseline: class D-E)																		
Class C	0.31	*	2.65	**	0.22	*	0.43	NS	3.05	NS	0.08	**	1.21	NS	0.24	*	0.51	*
Class A-B	0.20	**	8.50	***	0.22	*	0.41	NS	18.58	**	0.08	**	1.20	NS	0.14	**	0.46	NS
Urban	0.74	NS	0.59	NS	1.06	NS	0.98	NS	0.26	NS	0.67	NS	0.46	**	0.81	NS	4.06	***
Prenatal care in FHS	13.92	***	0.24	*	15.19	***	16.78	***	3.97	*	14.71	***	0.72	NS	13.44	***	10.57	***
Constant	4.50	NS	13.68	**	4.21	NS	1.50	NS	4.69	NS	22.38	**	1.02	NS	3.47	NS	0.28	*
Number of obs	329		318		284		328		321		309		312		153		329	
Pseudo R2	0.3770		0.1162		0.3822		0.3633		0.1975		0.4137		0.1047		0.3756		0.3403	
Log Likelihood	-123.75		-95.57		-111.40		-128.42		-41.10		-114.90		-193.58		-65.48		-149.60	

Note: *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%; NS not significant.
Source: SAMONTE database, 2013 e 2015.

5 – DISCUSSION

This paper presented the results concerning part of the impact evaluation of the LIACC implemented in Santo Antônio do Monte from 2013 until 2014. The entire evaluation will include the analysis of a broad spectrum of indicators based on other sources of quantitative and qualitative information. The main finding showed that the FHS coverage was universal even considering the presence of private health insurance. The importance of FHS in the supply of PHC was already noticeable before the intervention. Almost 98% of the households were registered in FHS while 91% received at least one CHA visit. These values are really higher than the coverage observed in Brazil. According to the National Research of Health conducted by the Brazilian Institute of Geography and Statistics (IBGE), in Brazil, in 2013, only 63% of the households were registered in the FHS and about 83% declared to have received at least one CHA visit in the reference (IBGE, 2014). Considering only municipalities with population-size from 20,000 to 30,000 inhabitants, in 2012 the mean coverage was 77% and for 50% of them the coverage was universal according to the Brazilian Ministry of Health website. These figures show that Santo Antônio do Monte is a municipality in a better position regarding the organization of the PHC. Furthermore, our findings show that public healthcare system is the main provider of PHC in small municipalities regardless the presence of private health insurance. Besides the FHS coverage, the supply of basic tests related to ANC, diabetes and hypertension were already high even before the intervention.

Specifically related to ANC, the organization of these services in the public sector seems to be consolidated in the whole country (ANDRADE et al., 2012). According to the National Research of Health (IBGE, 2014), the coverage of ANC is also almost universal (about 97%). However, it is worth to notice that FHS performs a different role acting as the main provider of ANC in Santo Antônio do Monte compared to Brazil: 87% of the ANC were monitored by FHT in this municipality versus 60% in the country (IBGE, 2014).

The comparison of the outcome variables between the two cross-sectional surveys revealed slight changes after the intervention. These findings are probably related to the high coverage of the PHC already observed in Santo Antônio do Monte before the LIACC implementation. Improvements in the access to the healthcare services are not easy to get when high levels of coverage were already attained. The choice of Santo Antônio do Monte as a pilot municipality of the Lab was not randomly defined by policymakers and hence affecting the results of the impact evaluation. Santo Antônio do Monte was chosen to receive this intervention because the secondary care presented a good performance in providing care to the target groups compared to other municipalities in Minas Gerais

State. The presence of well-organized secondary services was needed to guarantee the construction of a chronic care network.

The impact evaluation carried out in this paper presents some limitations. The first one concerns the intervention design. The LIACC is a complex intervention since it involves the incorporation of different tools in health care management. These tools included the introduction of changes in work process and several healthcare protocols for a very large group of professionals with different levels of schooling. These changes need time to be absorbed by all the agents involved in the system. Furthermore, the intervention comprised all the eight health units that present different socioeconomic conditions reflecting in the infrastructure of the facilities and in the composition of FHT. The second limitation regards to the schedule of the intervention and its further evaluation. The LIACC intervention was implemented in Santo Antônio do Monte from June 2013 to December 2014. This period is short not only to consolidate a new model of healthcare but also to get results associated to the intervention. This limitation will be addressed by using other sources of information collected in clinical records. The third limitation is related to the study design of the evaluation. As already mentioned, Santo Antônio do Monte was not randomly selected and a case/control analysis could not be defined due to ethical and political barriers. Besides, budget constraint avoided the sample expansion including other municipalities.

Despite these limitations, the evaluation presented in this paper is the first step to understanding the whole context of the health care utilization before and right after the intervention. This knowledge is fundamental to subsidize the impact evaluation that is being conducted using several sources of information. To the best of our knowledge, this is one of the first household survey conducted with a representative of a whole municipality that investigates the utilization of PHC by individuals with chronic conditions.

6 – REFERENCES

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