# Tuberculosis treatment adherence in homeless population: an overview and policy dialogue

## Adesão ao tratamento de Tuberculose na População em Situação de Rua: revisão e diálogo deliberativo

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## ABSTRACT

**Objective:** we conducted an overview of systematic reviews aiming to describe the existing interventions to increase the adherence to the TB's treatment by homeless people.

**Methods:** The effects and local applicability of these interventions in Brazil were obtained in a policy dialogue with stakeholders.

**Results:** Four interventions were effective: Financial incentives; Housing; Case management Programs; Assertive community treatment. It is recommended to combine all interventions to achieve effectiveness.

**Conclusion:** It's recommended to combine all interventions to achieve effectiveness.

**Key words:** Homeless persons; Tuberculosis; Health care; Social work.

## RESUMO

**Objetivo:** Realizar uma revisão de revisões sistemáticas acerca das intervenções existentes para aumentar a adesão ao tratamento de tuberculose em pessoas em situação de rua.

**Método:** Os efeitos e aplicabilidades locais dessas intervenções no Brasil foram obtidos em diálogo deliberativo com atores interessados.

**Resultados:** Quatro intervenções foram efetivas: Incentivos financeiros; Habitação; Programa de gerenciamento de casos; Tratamento comunitário assertivo.

**Conclusão:** Recomenda-se a associação de todas as intervenções para alcançar a efetividade.

**Palavras-chave:** Pessoas em situação de rua; Tuberculose; Atenção à saúde; Serviço Social.

## INTRODUCTION

Tuberculosis (TB) is the second major cause of mortality by infectious diseases with 1,5 million deaths in 2018, which represents a little over 15% of the total of patients[1-2]. The world distribution of TB cases is unequal, for instance, in 2018, Asia was responsible for 44% of all new cases, Africa for 24%, America for 3% and Europe, 3%(2). This geographical distribution illustrates that tuberculosis is a socially mediated disease[3].

According to WHO, 30 countries gather 87% of the tuberculosis's world burden. Brazil states among them as the only country representative from the Americas[2]. In 2015, there were 63.189 notified new cases of TB in Brazil, corresponding to an incidence coefficient (IC) of 30,9/100.000 inhabitants[4]. The IC in 2019 increased to 35/100.000 inhabitants[5]. More than two thirds of the cases were centered in 5,7% (315 of the 5.565) municipalities, in 2015, mainly in great urban centers and in population clusters[6]. Overall the incidence is higher in more vulnerable populations, such as the people deprived of liberty, the indigenous population and the homeless population (HP)[6-7].

HP is a group of individuals that have in common extreme poverty, broken or vulnerable family bonds, the lack of conventional regular housing and the use of public spaces and degraded areas as household and livelihood, whether temporary or permanent, as well as the use of sheltering facilities for overnight accommodation or temporary housing[8].

In 2008, Brazil held approximately 50 thousand homeless persons, with the majority of this group composed by male individuals[9]. This population is known to be at a higher risk of developing TB[6,10]. In 2014, the incidence of tuberculosis in HP showed to be up to 44 fold higher than the general population[7]. The adherence - also described as compliance, meaning voluntary cooperation of the patient for treatment or other health interventions[11] – in this specific population is known to be lower than the general population[12]. The data from the municipality of São Paulo, in 2014, reports a rate of abandonment of the treatment f 40,5% among homeless people[12], whilst in the general population this proportion was of 14,3%[13].

The non-adherence implicates in the abandonment of the tuberculosis treatment causing drug-resistant strains, aggravation of the disease and death[12]. The risk of death from TB is especially higher among HP[14]. Thus, understanding that the precariousness and insalubrity of the streets culminate in cumulative vulnerability that requires special care[15], it is important to understand effective interventions to mitigate this public health problem. The aims of this study were to describe the existing intervention to increase the adherence to the treatment of tuberculosis and to present a deliberative dialogue about the effects and local applicability of these interventions. The results may subsidize decisions in health policy to improve care for the homeless population.

## METHODS

An overview of reviews about the interventions was carried out in order to improve the adherence in the treatment of tuberculosis. Scientific literature search was carried out in six databases, using the MESH terms and systematic review filter of PUBMED. The search strategy was based on the following terms: "homeless", "homeless person", "homelessness", "street people", "treatment", and "medication adherence". There was also assistance from the librarian and it was decided not to search the term "tuberculosis".

The search for scientific evidence was performed in 2016. The database searched was: repository of the Health Virtual Library (http://www.bvsalud.org), Health Systems Evidence (http://healthsystemsevidence.org/), Center for Review Dissemination (https://www.york.ac.uk/drd/), PubMed (http://www.ncbi.nlm.nih.gov/pubmed/) Web of Science (https://webofknowledge.com/), Cochrane Library (www.cochranelibrary.com/) and systematic review register (http://www.crd.york.ac.uk/PROSPERO). No language restrictions was used and the search was conducted until April 2016. We used the Mendeley for management of references.

The eligibility criteria included interventions for homeless people and possible effects for improved treatment adherence. Public health consensus based on systematic reviews was included. Due to scarce data, we included all types of diseases that homeless people suffer.

Protocols, systematic reviews that didn't assess impact, and other types of reviews were excluded. Reviews containing duplication of studies analyzed were also removed.

Two authors independently performed the studies selection and quality analysis. Variables of analysis: intervention's elements and effects of the interventions.

The quality of the studies was assessed according to Assessing the Methodologial Quality on Systematic Reviews (AMSTAR tool)[16]. Each review was evaluated in terms of quality (AMSTAR quality assessment) for two independent reviewers.

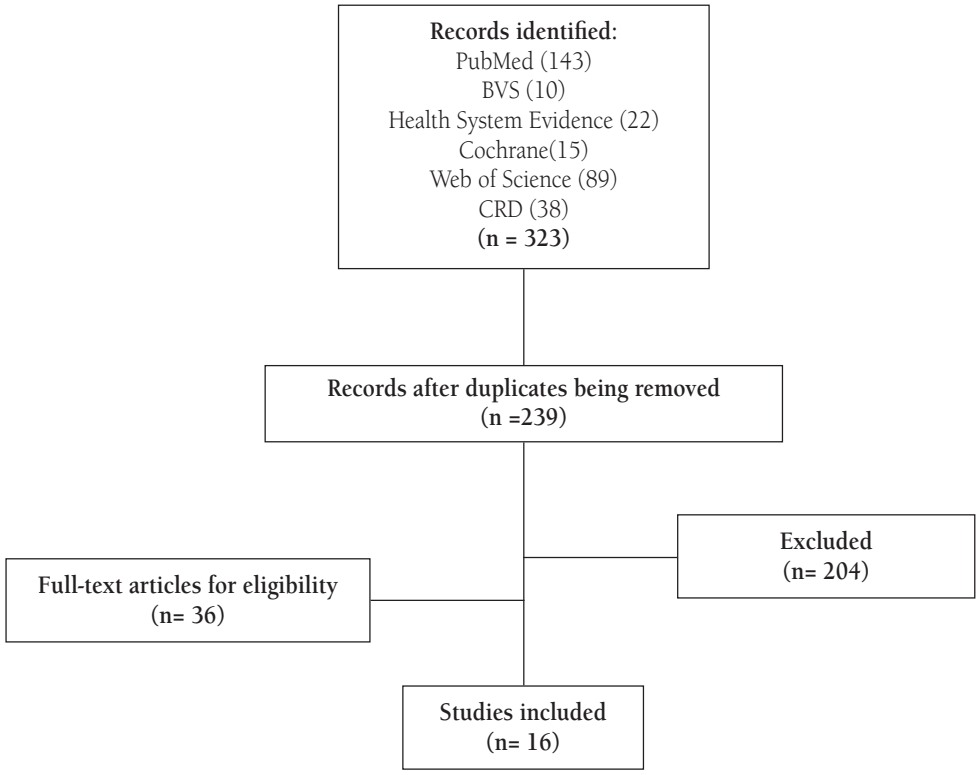
The effects and local applicability of the interventions found in the overview of reviews were obtained in a deliberative dialogue with Brazilian stakeholders. The profiles of the stakeholders were health systems and social assistance systems. The Deliberative Dialogue was carried out on June 22, 2016 and counted with 9 key actors of the Brazilian Public Health System (SUS), 5 key actors of the Unified Social Assistance System (SUAS), 5 researchers and 1 representative of a nongovernmental organization. The dialogue allowed us to contextualize the options found with the strategies adopted in Brazil by the Social Inclusion of People in Street Situation Policy implemented since 2012. The main results were based on assessment between findings of the overview and stakeholders' opinion about matter implementation.

## RESULTS

There were 89 duplicated studies among 323 that were withdrawn, leaving the total to 240 studies. After reading titles and abstracts, 36 were selected for full reading and 16 the inclusion criteria (Figure 1).

**Figura 1**

Flow of eligibility of the studies included in the overview of tuberculosis in homeless people.



Four interventions were effective to increase the adherence treatment for homeless population with tuberculosis: (i) Financial incentives to improve adherence (two high-quality systematic reviews[17-18]; (ii) Housing (two high-quality systematic review[19-20], two moderate[21-22] and one low-quality[23]; (iii) Case Management Programs (five high-quality[17,24–27], two low quality[28-29]); (iv) Assertive community treatment (two high-quality[17,30] and two moderate[31-32])(Table 2). (Appendix)

Two systematic reviews of high-quality[17-18] indicated financial incentives to improve adherence in the treatment or prevention of tuberculosis in short-term heathcare, mainly for vulnerable people such as the homeless population. Financial incentives include a) offering monetary material incentive; b) offering non-monetary material incentive (vouchers or shelters with meals); c) offering market basket; d) cash transfer programs.

Another two high-quality systematic review[19-20] demonstrated that the offer of housing is connected to the decrease of drug use and relapsing after abstinence, to the use of health services and to the improvement of the state of health of homeless people. Studies revealed that providing housing is effective for homeless people affected by infectious diseases (for example, HIV, TB and Hepatitis B) with higher rates of adherence to treatment. Housing includes rent assistance and institutional shelters that increases time of adherence to treatment.

The results indicate that the assertive community therapy may have better outcomes than the case management in improving psychiatric symptoms[17]. The motivational, cognitive-behavioral, vocational and based on partners interventions for young homeless people have shown improvement among the exposed groups with reduction of substance abuse, depression and psychological suffering.

Peer education is practice that engages the community[31]. These activities tend to indicate positive health outcomes for the homeless population in local communities. Intervention's main include: i) counseling; ii) motivational interventions; and iii) creation of bonds. (Table 3) (Appendix)

## DISCUSSION

Four interventions were effective to increase the adherence treatment for homeless population with tuberculosis among the systematic review searched: financial incentives and enablers to improve adherence; Housing first, Case management Programs; Assertive community treatment and peer education.

The financial incentives improve adherence but still studies related to this option about this health problem are scarce, especially in developing countries. The long-term effect of these interventions is still unclear, but Torrens and collaborators[33], that analyzed the influence of income transfer programs (Family Allowance Program – *"Bolsa Família"*) on the outcome of tuberculosis in the general population (people registered to CadÚnico – Brazil's Single Registry for Social Programs), have indicated a positive association between receiving the income and adherence to treatment.

Because of its high risk of developing TB and high rates of abandonment to treatment, the Brazilian National Tuberculosis Control Program considers the HP as priority for the disease's control, recommending guidelines to reach the homeless population into being fostered by local bodies involving basic care, as well as the governmental care network – nongovernmental social assistance network[6,34].

In general the recommendations are: (i) intersectoral approach, upon the establishment of a care network that gathers governmental and nongovernmental institutions (shelters, housings, living centers, accommodation houses, etc.)[7]; (ii) the setting of care facilities that will be reference to healthcare, establishing flow between these houses and the social protection network institutions; iii) awareness and training of professionals in order to cope with the specific marginalized context of homeless people; and iv) the offering of beds for the people in need of hospitalization in virtue of social vulnerability[6-7].

According to the stakeholders involved in the deliberative dialogue, the lack of adherence to the treatment of TB by HP needs to be understood as a multicausal problem, in which the interrelationship of determinants acts synergistically in the same individual. This may be associated with personal factors, such as low self-esteem, inadequate feeding, psychoactive substance abuse; related to treatment, such as need for daily intake; the dynamics of the street, which does not contribute to the regularity of drug intake, a differentiated temporal parameter[34]; and despite the existence of policies target to this population, there is still a lack of coverage of these services, a low coverage

of the support network and social support for the population, excessive bureaucracy, disarticulation and inadequate institutional positions, such as the prejudice and stigma that are their own policies and among health and care professionals, and may be potentiators of non-adherence to treatment.

It is necessary to look at this situation in an intersectoral and non-stratified manner, and it is extremely relevant to approach collectively the options for coping with the problem, so that one option complements the other. By envisaging the articulation of health, social assistance, social movements and civil society in the territory so that it reaches or approaches the solution, in which the person in a street situation with tuberculosis can be fully attended.

Considering the complexity of dealing with the health of the population living on the streets, one of the perceived difficulties is in relation to the amount of information on the scientific basis on this subject. In this overview two limitations were observed, one related to the absence of publications of systematic reviews containing Brazilian studies and low-income countries, and the other was a specific approach for the treatment of tuberculosis.

It is important to highlight that this data is limited to the period of analysis. Nowadays, the Brazilian social security system has decreased the capacity of assistance[35], the pace of poverty and inequality reduction did not increase in the general population[36] and, actually, the number of homeless persons escalated in the last four years[37]. Therefore, it is probable that the current scenario is worse than the evaluated for 2015[35], especially considering the COVID–19 pandemic[38].

## CONCLUSIONS

We aimed to systematically overview published systematic reviews that evaluate interventions proposed to increase adherence to tuberculosis treatment by the homeless population. Four interventions were effective to increase the adherence of the TB treatment among HP: Financial incentives and enablers to improve adherence; Housing, Case management Programs; Assertive community treatment and peer education. The stakeholders' recommendations are that all interventions must be associated in order to reach effectiveness. These interventions can increase adherence to treatment in homeless people and may allow the reduction of inequity in healthcare of patients in extreme poverty. In regards to the applications in the Brazilian context, it is necessary to increase the "*Bolsa família"* for homeless people and to provide peer education in specialized service involving health and social teams for support, to mitigate the TB among HP. Future researches should address new alternatives to mitigated the problem, considering current scenario of health care, poverty and co-morbidities as HIV and Covid-19 pneumonia.

## REFERENCES


1. WHO. World Health Organization (WHO). Tuberculosis. Key facts [Internet]. World Health Organization. 2020 [cited 2020 Apr 27]. Available from: https://www.who.int/news-room/fact-sheets/detail/tuberculosis

2. WHO. World Health Organization (WHO). Global tuberculosis report 2019. WHO. World Health Organization; 2020.

3. Rezende S, Cristina A, Carvalho C, Tuberculose PA De. Social determinants of health and catastrophic costs associated with the diagnosis and treatment of tuberculosis. 2020;46(5):1–5. DOI: https://doi.org/10.36416/1806-3756/e20200015.

4. Brazil. Brazilian perspectives on the end of tuberculosis as a public health problem - Boletim Epidemiológico. Minist Heal Heal Surveill Secr. 2016;47(13).

5. Brasil. Secretaria de Vigilância em Saúde | Ministério da Saúde Boletim Epidemiológico. 2020.

6. Brazil. Ministry of Health. Health Surveillance Secretaria. Department of Epidemiological Surveillance. Guidelines of Recommendations for Tuberculosis Control in Brazil. 2011.

7. Brazil. Control of Tuberculosis in Brazil: advances, innovations and challenges. Bol Epidemiológico Secr Vigilância em Saúde. 2014;45(2):13.

8. Brazil. Decree No 7.053, from December 23, 2009. Founded the National Policies for the Homeless Population and its Intersectoral Monitoring Committee, among other issues. [Internet]. Brasília, Brazil; 2009 [cited 2016 Mar 23]. Available from: http://www2.camara.leg.br/legin/fed/decret/2009/decreto-7053-23-dezembro-2009-599156-publicacaooriginal- 121538-pe.html

9. Brazil. Ministry of Social Development and Fight Against Hunger. Executive Summary: Brazil's Research on the Homeless Population. 2008;

10. Capewell S, France AJ, Anderson M, Leitch AG. The diagnosis and management of tuberculosis in common hostel dwellers. Tubercle [Internet]. 1986 Jun [cited 2019 Apr 4];67(2):125–31. Available from: http://www.ncbi.nlm.nih.gov/pubmed/3775861

11. da Silva NL, Ribeiro E, Navarro JL, Zanini AC. Compliance with treatment: Related-issues and insights for pharmacist intervention. Brazilian J Pharm Sci. 2011;47(1):1–12. DOI: https://doi.org/10.1590/S1984-82502011000100002

12. São Paulo (Cidade). Estratégias no enfrentamento da tuberculose na população em situação de rua na cidade de São Paulo [Internet]. VII Assembleia da Rede de Comitês TB. 2015 [cited 2016 Sep 26]. Available from: https://drive.google.com/file/d/0B0CE2wqdEaR- Wm1TLTVhQ29FWWc/view

13. São Paulo (Cidade). Boletim TB 2016. 2016.

14. Ranzani OT, Rodrigues LC, Bombarda S, Minto CM, Waldman EA, Carvalho CRR. Long-term survival and cause-specific mortality of patients newly diagnosed with tuberculosis in São Paulo state, Brazil, 2010–15: a population-based, longitudinal study. Lancet Infect Dis. 2020;20(1):123–32. DOI: https://doi.org/10.1016/S1473-3099(19)30518-3.

15. Brazil. Ministério de Desenvolvimento Social e Combate à Fome. Tipificação Nacional de Serviços Socioassistenciais [Internet]. 2014 [cited 2016 Mar 9]. Available from: https://www.mds.gov.br/webarquivos/publicacao/assistencia_social/Normativas/tipificacao.pdf

16. Shea B, Grimshaw J, Al. E. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Med Metodol. 2007;7:10. DOI: https://doi.org/10.1186/1471-2288-7-10.

17. Hwang SW, Tolomiczenko G, Kouyoumdjian FG, Garner RE. Interventions to improve the health of the homeless: A systematic review. Am J Prev Med [Internet]. S.W. Hwang, Centre for Research on Inner City Health, St. Michael's Hospital, Toronto, Ont. M5B 1W8, Canada; 2005;29(4):311.e1-311.e75. Available from: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L41483538

18. Lutge EE, Wiysonge CS, Knight SE, Sinclair D, Volmink J. Incentives and enablers to improve adherence in tuberculosis. Cochrane Database Syst Rev [Internet]. 2015 Sep 3 [cited 2018 Jun 12]; Available from: http://doi.wiley.com/10.1002/14651858.CD007952.pub3

19. Fitzpatrick-Lewis D, Ganann R, Krishnaratne S, Ciliska D, Kouyoumdjian F, Hwang SW. Effectiveness

of interventions to improve the health and housing status of homeless people: a rapid systematic review. BMC Public Health [Internet]. D. Fitzpatrick--Lewis, The Effective Public Health Practice Project, School of Nursing, McMaster University, Hamilton, Canada.; 2011;11:638. Available from: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L362828091

20. Leaver CA, Bargh G, Dunn JR, Hwang SW. The effects of housing status on health-related outcomes in people living with HIV: A systematic review of the literature. AIDS Behav [Internet]. C.A. Leaver, Centre for Research on Inner City Health, Keenan Research Centre, Li Ka Shing Knowledge Institute of St Michael's Hospital, Toronto, Ont. M5B 1W8, Canada; 2007;11(SUPPL. 2):S85–100. Available from: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L47620328

21. Aidala AA, Wilson MG, Shubert V, Gogolishvili D, Globerman J, Rueda S, et al. Housing status, medical care, and health outcomes among people living with HIV/AIDS: A systematic review. Am J Public Health. 2016;106(1):e1–23. DOI: https://doi.org/10.2105/AJPH.2015.302905.

22. Kyle T, Dunn JR. Effects of housing circumstances on health, quality of life and healthcare use for people with severe mental illness: A review. Heal Soc Care Community. 2008;16(1):1–15. DOI: doi: https://doi.org/10.1111/j.1365-2524.2007.00723.x.

23. Nelson G, Aubry T, Lafrance A. A review of the literature on the effectiveness of housing and support, assertive community treatment, and intensive case management interventions for persons with mental illness who have been homeless. Am J Orthopsychiatry [Internet]. 2007;77(3):350–61. Available from: http://apps.webofknowledge.com/full_record.do?product=WOS&search_mode=Refine&qid=12&SID=3FuZO4pCmkWLaEZnqvS&page=1&doc=4

24. Bryant J, Bonevski B, Paul C, Mcelduff P, Attia J. A systematic review and meta-analysis of the effectiveness of behavioural smoking cessation interventions in selected disadvantaged groups. Addiction. 2011;106(9):1568–85. DOI: https://doi.org/10.1111/j.1360-0443.2011.03467.x.

25. Coldwell CM, Bender WS. The effectiveness of assertive community treatment for homeless populations with severe mental illness: A meta-analysis. Am J Psychiatry [Internet]. C.M. Coldwell, New Hampshire Hospital, Concord, NH 03301, United States; 2007;164(3):393–9. Available from: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L46513151

26. Drake RE, Mueser KT, Brunette MF, McHugo GJ. A Review of Treatments for People with Severe mental illnesses and co-occurring substance use disorders. Psychiatr Rehabil J. 2003;27(4):360–74. DOI: https://doi.org/10.2975/27.2004.360.374.

27. Ford N, Nachega JB, Engel ME, Mills EJ. Directly observed antiretroviral therapy: a systematic review and meta-analysis of randomised clinical trials. Lancet [Internet]. 2009 Dec 19 [cited 2019 Apr 4];374(9707):2064–71. Available from: http://www.ncbi.nlm.nih.gov/pubmed/19954833

28. Chaulk C, Kazandjian VA, for the Public Health Tuberculosis Guidelines Panel. Directly observed therapy for treatment completion of pulmonary tuberculosis: Consensus statement of the public health tuberculosis guidelines panel. Jama [Internet]. 1998;279(12):943–8. Available from: http://dx.doi.org/10.1001/jama.279.12.943%5Cnhttp://jama.jamanetwork.com/data/Journals/JAMA/4553/JST71009.pdf

29. Vanderplasschen W, Wolf J, Rapp RC, Broekaert E. Effectiveness of different models of case management for substance-abusing populations. J Psychoactive Drugs [Internet]. W. Vanderplasschen, Ghent University, Department of Orthopedagogics, B-9000 Gent, Belgium; 2007;39(1):81–95. Available from: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L46764235

30. Speirs V, Johnson M, Jirojwong S. A systematic review of interventions for homeless women. J Clin Nurs. 2013;22(7–8):1080–93. DOI: https://doi.org/10.1111/jocn.12056.

31. Altena AM, Brilleslijper-Kater SN, Wolf JLM. Effective Interventions for Homeless Youth. A Systematic Review. Am J Prev Med [Internet]. Elsevier Inc.; 2010;38(6):637–45. Available from: http://dx.doi.org/10.1016/j.amepre.2010.02.017

32. Priebe S, Richardson M, Cooney M, Adedeji O, McCabe R. Does the therapeutic relationship predict outcomes of psychiatric treatment in patients with psychosis? a systematic review. Psychother Psychosom. 2011;80(2):70–7. DOI: https://doi.org/10.1159/000320976.

33. Torrens AW, Rasella D, Boccia D, Maciel ELN, Nery JS, Olson ZD, et al. Effectiveness of a conditional cash transfer programme on TB cure rate: a retrospective cohort study in Brazil. Trans R Soc Trop Med Hyg [Internet]. 2016 Mar 16 [cited 2019 Apr 8];110(3):199–206. Available from: http://www.ncbi.nlm.nih.gov/pubmed/26884501

34. Brasil. Ministério da Saúde. Manual Sobre o Cuidado à Saúde Junto a População em Situação de Rua [Internet]. 2012 [cited 2019 Apr 8]. Available from: http://189.28.128.100/dab/docs/publicacoes/geral/manual_cuidado_populalcao_rua.pdf

35. Macinko J, Victora C. Dying to work: the health consequences of economic recession. Lancet Glob Heal [Internet]. The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY NC ND 4.0 license; 2019;7(11):e1478–9. Available from: http://dx.doi.org/10.1016/S2214-109X(19)30415-2

36. World Bank. Brazil Overview [Internet]. 2020 [cited 2020 Apr 27]. Available from: https://www.worldbank.org/en/country/brazil/overview

37. São Paulo. Prefeitura de São Paulo divulga Censo da População em Situação de Rua 2019 — Prefeitura [Internet]. [cited 2020 Apr 27]. Available from: http://www.capital.sp.gov.br/noticia/prefeitura-de-sao-paulo-divulga-censo-da-populacao-em-situacao-de-rua-2019

38. Maciel ELN, Gonçalves Júnior E, Dalcolmo MMP. Tuberculosis and coronavirus: what do we know? Epidemiol e Serv saude Rev do Sist Unico Saude do Bras [Internet]. 2020;29(2):e2020128. Available from: http://www.ncbi.nlm.nih.gov/pubmed/32294755

## APPENDIX

**Table 2**

Characteristics of the studies included in the overview of tuberculosis in homeless people

| Author / year | Countries of primary studies | Study Design | Population condition | Related intervention | Results and Application for Tuberculosis | AMSTAR |
|---|---|---|---|---|---|---|
| **Lutge et al.[18] / 2015** | USA (n=10), South Africa (n=1) and Timor-Leste (n=1) | 12 trials (RCTs) included | Homeless with tuberculosis n=8.824 participants. | Monetary incentive compared to non-monetary<br>Monetary incentive for each preventive therapy visit compared to education or counseling with partners sessions in order to promote TB prevention in homeless adults. The third study offered US$5 for the HP who would return for the first care after a positive diagnosis of tuberculosis. | The monetary incentive was more effective than the non-monetary (trial with 141 participants generating relative risk (RR) of 1,26, (CI95% 1,02;1,56). There hasn't been any meaningful difference between monetary incentives and education or counseling (RR 1,04, CI 95% 0,59-1,83; three trials and a total of 837 participants). | 10/11 |

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|---|---|---|---|---|---|---|
| **Hwang at al.17 / 2005** | Non- informed | 73 studies, 13 were rated as good quality, 32 were fair, and 28 were poor. | Homeless with mental disorder, Alcohol and other drug use, latent tuberculosis | Financial incentives (cash money or vouchers of the same value) to increase adherence to the treatment of the latent form of tuberculosis.<br>Monetary incentive in the first care and partner assistance to accompany users to the clinical visit.<br>Monetary incentive for each directly observed preventive treatment visit accompanied by partners.<br>Healthcare assistance program with clinical follow-up, directly observed treatment (DOT), full time social assistants and easy access to housings with meal offers. | From the six studies regarding TB in homeless population, four reported material incentives and only two were of good quality.<br>Considering the two studies with good qualities focusing homeless people with latent tuberculosis, monetary incentives improved adherence rates.<br>One compared the standard practice of treatment for the latent form of tuberculosis with two types of incentives: i) offering of US$5 per visit for directly observed treatment; ii) offering of a voucher with the amount of US$5 per visit for directly observed treatment. Both interventions show themselves effective when compared to the standard practice (non-offering of financial incentives). The second study assessed the offer of a US$5 value in the first visit for directly observed treatment and the assistance of partners for the clinical visit. | 9/11 |
| **Aidala, et al.[21] / 2016** | USA (n=112), Canada (n = 27), France (n = 7), Spain (n = 3) and one each in Italy, Finland and South Korea. | 152 studies, 2 RCT, 64 observational. | Homeless living with HIV infection | Provide housing with medical care for people living HIV infection. | The studies included 143.404 participants of whom 139.757 were HIV positive. The results have shown that for homeless, interventions that addressed the housing needs potentially improve the health outcomes of people, reducing health inequalities and HIV transmission. | 6/10 |
| **Fitzpatrick-Lewis et al.[19] / 2011** | USA (n=8), Canada (n=2) | 10 studies, 7 RCT, and 3 observational | Homeless with Mental illeness, substance abuse, HIV | Provide housing and ttreatment programs for mental illness and the use of psychoactive substances. The studies included 8.744 participants. | Compared to the standard healthcare, the simultaneous treatment programs associated with housing result in the improvement of health conditions and access to healthcare. | 9/10 |

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|---|---|---|---|---|---|---|
| **Kyle; Dunn22 / 2008** | Non-informed | 29 studies | Homeless with mental illness | Providing permanent housing minimized damages and may encourage people to voluntarily seek for treatment. | Housing interventions benefit the homeless population. Providing permanent housing minimized damages and may encourage people to voluntarily seek for treatment because reduce many vulnerable situations | 5/11 |
| **Leaver et al.[20] / 2007** | USA (n=22), European Union (n=4), Canada (n=1), Australia (n=1), and Cote d'Ivoire (n=1). | | Homeless living with HIV/AIDS who were in contact with the health care system | Provide housing | Considering five studies that examined the impact of housing on the state of health outcomes among people who live with HIV/AIDS, and three of these studies examined the housing status and co-infection with hepatitis C or tuberculosis (TB), all of them showing improvement status on health-related outcomes. | 8/11 |
| **Nelson; Aubry; Lafrance[23] / 2007** | USA | | Homeless with mental illness | Multi interventios | The main results indicate that programs combined with stable housing are effective for the adherence to treatment (effect size=0,67), followed by assertive community treatment (ACT) (effect size=47), while weaker results were found for intensive care management programs (size effect=2S). | 1/11 |
| **Bryant et al.[24] / 2011** | Non-informed | 32 studies, only one RCT | Smoking homeless population | Behavioral motivational and individual interviews. | Considering one randomized clinical trial (RCT) (n=46) addressed to the. The intervention group gathered five motivational and individual interviews, focused on the knowledge and smoking behavior combined with group sessions for eight weeks versus solely individual sessions. There hasn't been any meaningful difference between the two interventions during the eight weeks (17,4% versus 13%) or even in 26 weeks (17,4% versus 8,7%). | 7/11 |

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| **Coldwell; Bender[25] / 2007** | Non-informed | 8/10 studies | Homeless with severe mental illness. | Assertive community treatment | In eight out of ten studies, the assertive community treatment has shown bigger success in the HP. In the RCT, the intervention resulted on an average effect of 37% higher (CI 95%=18% - 55%, p=0.0001) than the case management. In the observational studies, the average was of 104% (CI 95%=67% - 141%, p<0.0001) when compared to baseline levels of street living episodes. In the hospitalization reduction, the assertive community treatment was equivalent to the case management standard. | 8/11 |
| **Vanderplasschen et al.29 / 2007** | | 48 primary studies. | population with drug abuse, alcoholism and homeless | Case management models: i) assertive community treatment and intensive case management (wide approach, focused on the patient, with team planning and service provision); ii) clinical case management (clinical model of a professional responsible for providing services); iii) general case management (under the responsibility of a professional, centered on the service); iv) processes management based on strong points (under the responsibility of a professional, approach based on strengthening the user). | Four studies with different approaches addressed the HP. Those with most severe substance abuse history has presented significantly worse results (Cox and collaborators (1998); Stahler and collaborators (1995), n=193 and n=722, respectively). Among the groups, the effects were especially small in randomized clinical trials (RCT) that compared intensive care management to the standard wide treatment (Braucht and collaborators (1995) n=323; Stahler and collaborators (1995)). The partially randomized clinical trial (Orwin and collaborators (1994), n=930) has shown that the intensive case management was more effective to improve housing and reduce substances abuse in one of the three sites after nine months. | 2/10 |

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| **Ford et al.27 / 2009** | USA, Mozambique; Nigeria; South Africa | 12 primary studies | patients with HIV infection who are on highly active antiretroviral therapy (HAART) | directly observed therapy as a potential adherence support strategy for HAART. Supervised swallowing of HAART pills as direct observation; They analyzed these data to look at the difference between directly observed and self-administered treatment in several subgroups | One clinical trial with the HP (n=82) comparing the directly observed antiretroviral treatment held for five days a week in the community with the self-administered. The relative risk for the viral load reduction was of RR=1,44 (CI 95% 0,72-2,89), and there hasn't been a significant reduction between groups. The follow-up loss and the mortality rate were of 0,30(0,02-4,02), and the CD4 reduction was of -9 (-96 to 76). | 11/11 |
| **Drake et al.26 / 2004** | Non-informed | 12 experimental and 4 with quasi-experimental designs | People with mental disorder and co-occurrence of drug and alcohol abuse. | Interventions with long-term active treatment (full care) involving an interdisciplinary team for the intensive case management with a vast number of treatment options based on counseling about substances abuse and optional housing assistance. | A quasi-experimental study with 217 HP with mental disorder and psychoactive substance abuse diagnosis was included in the systematic review. The multifaceted intervention included the intensive care management with counseling on substance abuse and home assistance, compared to not-full services. The users were accompanied during 18 months after the diagnosis. The multifaceted intervention produces improvements in mental disorder treatment with hospitalization cases and alcohol abuse reduction. In the intervention group, the commitment of the users was of 91% compared to 58% of the standard practice (only therapeutic counseling). | 06/11 |

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| **Chaulk et al.[28] / 1998** | United State (n=9), Thai-cambodian(n=1), South Africa (n=3), Philippines (n=2), China (n=3), Thailand (n =1), Spain (n=1), Ethiopia (n=1), Canada (n=1), England (n=1), Zimbabwe (n =1), India (n=1), Ghana (n=1), Japan (n=1) | 05 RCT, 12 prospective trials without control, 07 retrospective studies, 02 case-control studies, and one cross-sectional report. | populations such as the homeless people, alcohol dependents, prisoners and people with tuberculosis and HIV co-infection | Directly observed therapy in achieving treatment completion for pulmonar tuberculosis | The review included 27 studies with various elective approaches that dealt with strategies whose outcomes were the completeness of the pulmonary tuberculosis treatment. Twelve studies reported completeness rates of 86% to 96,5% for different populations such as the homeless people, alcohol dependents, prisoners and people with tuberculosis and HIV co-infection. The directly observed treatment (DOT) strategy was wide and centered on the patient, involving some kind of incentive or facilitators. The use of the DOT included regimes of less than five times a week administered in schools, on the streets, at home, based on the patient's lifestyle. The incentives were diversified (clothes, meal, monetary payment, treatment contracts, encouraging and cultural appropriate messages). The medicine administration and guidance were held by community workers or health professionals. For the homeless population, the temporary housing or hospitalization followed by wide case management were added to the treatment. | The AMSTAR tool hasn't been used, because this review was prepared for a consensus panel for the tuberculosis guidelines for the public health |

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| **Altena; Brilleslijper-Kater; Wolf 31 / 2010** | United State (n=9), Canada (n =1) and South Korea (n= 1) | five RCTs, five quasi-experimental designs, and one pre–post design | youth and adolescents homeless | The interventions for homeless youth were classified into seven main types: intensive case management (n=1); independent living programs (n=2); brief motivational interventions (n=2); cognitive– behavioral interventions (counseling; n=3); living skills/vocational interventions (n=1); supportive housing (n=1); and peer-based interventions (n=1). | The systematic review included 11 original articles, four of them considered of adequate quality and none of them good. The studies regard interventions on young homeless people, especially adolescents. The authors haven't presented evidences that specific interventions are effective for the targeted-population, because of the low number of studies and the low-quality of the studies included. Most interventions (n=8) were measured in an individual level and three in group. The conclusions are also limited because of the heterogeneity of the interventions, methods, participants and measurement of the results. The most convincing findings were the ones related to interventions based on the cognitive-behavioral approach. | 5/10 |

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| **Priebe et al.32 / 2011** | United States (n= 3), Canada n =2), Swede (n =2), Germany (n=1) and United Kingdom (n =1) | 9 studies | Homeless person with physical and mental health | Construction of a therapeutic relationship (bond between professionals and patients) | Two included the targeted-population (HP). The studies were limited due to a low number of articles included and the heterogeneity of methods. The positive therapeutic relationship was associated to the reductions of the hospitalization numbers and the favorable changes of symptoms and occupational, cognitive and psychological functions. One study targeting the homeless population has shown the association between the bond's quality and the improvement of the symptoms' levels, but not in a statistically significant manner. The other study included addressing the homeless population also measured life satisfaction, addiction severity, social support, depression, working days and homeless days, but hasn't found statistical association. | 5/11 |

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| **Speirs; Johnson; Jirojwong30 / 2013** | United States ( n = 4), United Kingdom ( n = 2) | Two RCTs, three quasi-experimental trials and a cohort study. | homeless women with physical and mental health. | physical and psychosocial interventions for homeless women. The interventions were: Community nursing, Interventions included group education sessions on human immune deficiency virus (HIV), residential care called therapeutic community and advocacy, Education, given in group sessions and one-on-one, either actively | The studies included 1008 participants. There was a diversity of methodologies, interventions, outcomes and measurement tools among the studies comprised. From 30 possible points in the quality assessment, performed by the authors, half (n=3) scored between 24 to 28; two between 20 and 22 and one scored 17. The authors indicate that structured education, support sessions and community therapy are capable of increasing self-esteem and reducing psychological suffering, the use of health services and the use of alcohol and other drugs. The authors concluded that the nurse professionals may perform advocacy for homeless women by means of monitoring health needs, being in touch with social services and healthcare services renderers, assuming an important role in these women's healthcare. | 7/10 |

*USA – United States of America; RCT - randomized clinical trial; TB – Tuberculosis; HP – Homeless population; HIV - human immune deficiency virus; RR – Relative Risk; CI - confidence interval; DOT - directly observed treatment; ACT - by assertive community treatment; HAART - highly active antiretroviral therapy*

**Table 3**

Synthesis of interventions to increase the adherence treatment for homeless population with tuberculosis.

| Findings of review: What could we bring to increase the adherence treatment for homeless population with tuberculosis? | Policy dialogue: What do the stakeholders think about in relation to Brazilian policies? |
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| FINANCIAL INCENTIVES<br>Aim: to reward healthy behaviors and remove economic obstacles to access healthcare.<br>Types of incentives: money, food baskets, meals and transportation vouchers and meal allowances and conditional cash transfers.<br>OUTCOMES:<br>(+) bound between professionals and homeless people<br>(+) treatment completeness for infectious disease<br>(-) patient became dependent on the incentives | Most of the stakeholders agreed about the material incentive offer as an important strategy to assist in the individual's adherence to tuberculosis treatment and scored some successful Brazilian actions, such as the offer of vouchers for citizen restaurant.<br>The supply of food must be a way to guarantee the access to a human right and from this initiative creates the link with the professionals involved. |
| HOUSING<br>Aim: improve social conditions.<br>Types of support: rent assistance, housing first strategies, institutional shelters, temporary housing.<br>OUTCOMES:<br>(+) adherence for infectious disease treatments<br>(+) adherence for therapeutic interventions<br>(-) inadequacy of institutional shelters | The participants raised important questions, reflecting about the reality of the country in relation to the lack of infrastructure of shelters (overcrowded and precarious accommodation conditions, non-strategic location and access difficulties). Another significant point was the complexity of offering support to street people with disabilities, the LGBT population (lesbians, gays, bisexuals, transvestites and transgenders) and those with mental disorders, among others. Considering that Brazil does not have an established policy of providing permanent housing for this population. |
| CASE MANAGEMENT PROGRAMS<br>Aim: improve individualized therapeutic plans.<br>Types of programs: Assertive practices and individualized plans according to the person's condition, directly observed treatment for TB, intensive case management with interdisciplinary care team held whether outdoors or inside facilities, professionals specialized in marginalized populations.<br>OUTCOMES:<br>(+) Bound between professionals and homeless people<br>(+) Completeness rate of treatments<br>(-) Unprepared professionals<br>(-) Patient becomes dependent on the professionals | It was highlighted the importance that human resources have in relation to the practice of health care, since this practice is not inserted within the service but in the one who operates it, the professionals. It is important to express the safe and guaranteed care flows for this population according to their particularity and needs. This practice is fundamental for solving problems encountered in health care and for the qualification of the care provided to the subjects. It is important to look at the person as someone who has their own needs and who needs to be understood by himself and by the professionals who serve him. |
| ASSERTIVE COMMUNITY TREATMENT AND PEER EDUCATION<br>Aim: to strengthen bounds<br>Types of programs: Assertive practices in therapeutic community, motivational, cognitive-behavioral e vocational approaches based on partners interventions for young homeless people, peer educational programs<br>Outcomes:<br>(+) Better bound between peers<br>(+) Higher co-responsibility and knowledge about the matter<br>(-) Patient becomes dependent on the therapeutic community<br>(-) Unprepared apphroaches and absences. | Participants reported that the intervention resembled the work performed by the street Practice Teams on the (sPT) in Brazil. It was pointed out the need to build therapeutic projects respecting the uniqueness and history of each patient, providing a greater reliability of the person in street situation with the professional. The creation of professional-patient bond was pointed out by many as primordial to combat the complexities of the living conditions and health of the population in street situation and to reach equity. |

*Notes: (+) positive outcomes, (-) negative outcomes.*