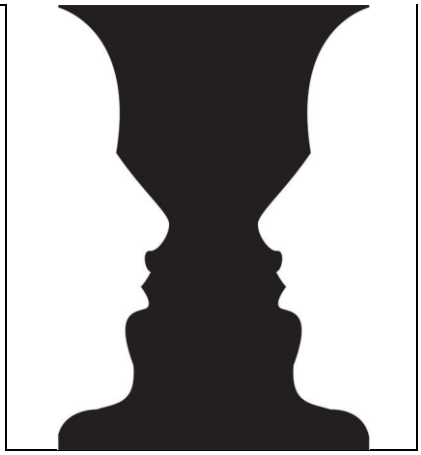
JOURNAL OF COMPARATIVE RESEARCH IN ANTHROPOLOGY AND SOCIOLOGY

Volume 15, Number 1, Summer 2024
ISSN 2068 – 0317
http://compaso.eu



The deadliest disease nobody thinks about. Correlating financial incentives and adherence to treatment for Tuberculosis patients

Maria-Larisa Șoroagă[1]

Abstract

Tuberculosis (TB), caused by Mycobacterium tuberculosis, has been a persistent global health challenge for thousands of years, known historically by various names and often romanticized in 19th-century literature. Despite advancements in medical science, TB remains a significant issue, particularly in economically disadvantaged regions like Romania, which has one of the highest TB mortality rates in the European Union. The disease's ability to remain latent and become active when the immune system is weakened contributes to its persistence and danger. Adherence to TB treatment is crucial for controlling the disease and preventing the development of drug resistance. Factors affecting adherence include socio-economic status, education, access to healthcare, and social support. Financial incentives have been shown to improve treatment adherence among vulnerable populations, suggesting that addressing economic barriers is essential for effective TB control. This study explores the socio-historical context of TB and evaluates the effectiveness of financial incentives in improving treatment adherence, especially for multidrug-resistant (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB). Moreover, a quantitative analysis was performed on MDR-TB and XDR-TB patients in order to achieve a comprehensive grasp on the interaction between financial incentives and adherence to treatment. This article highlights the importance of a patient-centered approach in TB treatment, incorporating psychological and social support to enhance adherence. More precisely, the combination of socio-historical and quantitative analyses pinpoints the fact that improving living conditions and providing financial aid are vital components in the battle against TB.

[1] Doctoral School of Sociology, University of Bucharest, Romania, soroaga.larisa@gmail.com.

Keywords
Tuberculosis; Multidrug-resistant tuberculosis; Extensively drug-resistant tuberculosis; Mortality rates; Drug resistance; Financial incentives;

Introduction

In the ancient Chinese medical text Huang Ti-Nei Ching, it was called *huaifu*, meaning "bad palace" (Agarwal et al., 2017). In the Old Testament, in hebrew, it was called schachepheth, meaning "wasting away" (Daniel & Daniel, 1999). In the 19th century, it was called "consumption" (Manoli-Skocay, 2015) because of the way it seemed to consume the body. Now, the disease caused by the bacteria called Mycobacterium tuberculosis (Burke, 2011) is commonly know as tuberculosis (TB). Regardless of its name, the disease has been an issue for thousands of years (Mays & Taylor, 2003).

Tuberculosis, besides its capacity to be lethal, is still a glaring problem due to its elusive nature. Thus, not only can TB be easily spread through air particles but the body can also remain infected without the disease manifesting until the moment the immune system is weakend (Burke, 2011). While the disease itself does not discriminate, the amount of fatalities it causes are the result of discrimination due to economic discrepancies and lack of financial aid for TB patients. Romania, is the perfect example of this, taking the third place regarding the highest mortality rates from TB in EU (ECDS, 2024). Financial incentives are supposed to function as an equalizer in the "battle" against TB, yet the question still remains: how effective are they really? Thus, this study's aim is to historically and sociologically contextualize tuberculosis while identifyng how effective financial incentives are in increasing and maintaining adherence to treatment regarding the more dangerous types of TB, namely multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB).

Tuberculosis in the 19th century

While TB had existed for a long time already, the disease, like many other things, didn't become real until it felt real. In other words, only in the 19th century when the effects of TB started to fit into an observable pattern, the disease became a reality. This new reality plunged the world "in an era where discovering that you have tuberculosis equated to an early death sentence" (Pârvulescu, 2005, p.160).

In the "romantic" Europe of the century before the discovery in 1882 by bacteriologist Robert Koch of the M. tuberculosis bacillus, which demonstrated the infectious nature of the disease (Burke, 2011), a standard medical text of the time cataloged the causes of tuberculosis as "hereditary disposition, unfavorable climate, sedentary indoor life, poor ventilation, lack of light, and depressive emotions" (Sontag, 1977, p.54). Even a "tuberculous" temperament had been defined: melancholic, extreme, passionate – in other words, romantic (Star & Bowker, 1997). Many literary and artistic works of the 19th and 20th centuries included the tuberculous character, an ethereal, chaste being brimming with innocence, incapable of coping with life's brutality, cheated out of life and rewarded for their struggle to stay alive, only with death. It was said that tuberculosis "causes

euphoric states and has aphrodisiac powers," that "unlike other diseases, it gives the patient an appearance of health, colors their cheeks, makes them breathe faster, as if they were always excited" (Pârvulescu, 2005, p.160). Among the educated class, tuberculosis was, in a way, celebrated as the disease of "innate victims, of sensitive and passive individuals who are not sufficiently in love with life to survive" (Sontag, 1977, p.25). The romanticized image of the pale and sensitive individual even became desirable, especially for middle-class women, giving rise to the recurring image of the tuberculous courtesan, indicating an association between disease and sexual attractiveness (Sontag, 1977).

However, prosaic reality revealed that while tuberculosis took the stage, hidden behind the veil was not romanticism. It was poverty. TB bacilli could be rejected by an individual's immune system, thus avoiding infection. Even if infection with the tuberculosis bacterium occurs, it can remain inactive, with the disease manifesting only when the immune system is compromised (Burke, 2011). Therefore, the populations most frequently showing signs of the disease were actually from the lower strata of society – too poor to afford sufficient living conditions to maintain immunity.

Tuberculosis in Romania (19-20th century)

Living conditions in the young Romanian state did not ensure sufficient living conditions for many citizens. In 1882, the year of the discovery of the M. tuberculosis bacillus, tuberculosis caused more than 800 deaths out of 4,868 in Bucharest, equivalent to approximately 16% (Pele et al., 2009). Statistical data collected and analyzed by one of Romania's first female doctors, Ecaterina Arbore (1873-1937), for the period 1875–1904, show that in Bucharest, the annual number of deaths caused by tuberculosis fluctuated between 725 and 1,231, reaching a rate of 4.25 per thousand inhabitants. Of course, tuberculosis did not only affect Bucharest but almost all villages and towns in the country, with high mortality rates even among children. Tuberculosis affected numerous notable personalities at the end of the 19th and beginning of the 20th centuries, including journalist Alexandru Antemireanu, writer Emil Gârleanu, poet Nicolae Milcu, artist Mihai Floresa, composer Filip Lazăr, physician Şerban Eminovici (brother of Mihai Eminescu), and others (Munteanu et al., 2016).

The first half of the 20th century was marked by tuberculosis, perceived as a social disease in the Romanian context, with measures to combat tuberculosis also involving the detection of social causes, given that it represented one of the most important factors in the biological decline of the ethnic entity (Andreescu, 2013; Moldovan, 1926). A series of social measures were even instituted for individuals suffering from pulmonary tuberculosis, with conditions for marriage stipulated: those with closed and old tuberculosis lesions could marry under medical supervision, while those with open bacillus lesions could marry only after 3-5 years (Banu, 1943).

In a retrospective study on the incidence of tuberculosis cases, Golli et al. (2019) identified an incidence rate of 106.8 per 100,000 population in 1996 (a rate that reached high levels not seen in the previous 20 years), increasing by 38.5% in 2002 (142.2 per 100,000 population). After 2002, the incidence of tuberculosis decreased, but with annual

variations: 74.5 cases per 100,000 population in 2014, 82 cases per 100,000 population in 2015, and 74 cases per 100,000 population in 2016. However, tuberculosis has not yet been eradicated and continues to have a significant impact on global health and in Romania (e.g., Golli et al., 2019; Nițu et al., 2017). The incidence of tuberculosis cases in Romania is more than four times higher than in the rest of the European Union and affects the most vulnerable population who have a lifestyle exposed to disease contact or who have a precarious health condition that favors the onset of the disease (WHO, 2019).

On the other hand, scientific, technical, and economic progress was beginning to make its effects felt. The natural sciences began their development in Romanian territory with the onset of industrialization at the end of the 19th century. Even during the period of the Principalities (before the War of Independence), famous researchers emerged: physicist and mathematician Emanoil Bacaloglu, chemist Alexe Marin, doctors Nicolae Kretzulescu and Carol Davila, the founder of Romanian higher medical education. This was the period when André-Victor Cornil (1837-1908) published the world's first bacteriology treatise (1885), and hygiene became central for progressive doctors, including in Romania, where initiatives by doctors Ștefan Episcopescu, Constantin Vîrnav, Iuliu Barach, and Iacob Felix supported medical evolution primarily based on prophylaxis (Radu, 2012).

Georgescu N., Chief Physician of the Capital from 1892 to 1905, obtained in 1898 from the Brâncovenesc Hospital Trust the donation of barracks on Dealul (a quarantine space in case of a cholera epidemic) for the establishment of a hospital for treating tuberculosis patients (Pele et al., 2009). In the same year, the first position of communal physician specialized in tuberculosis (prophylaxis, diagnosis, treatment) was established (albeit for a short period), primarily dedicated to the poor classes, where the TB bacillus always found room to thrive. Unfortunately (and representative of the educational level of the time), some beneficiaries saw this form of social and health assistance as an intrusion and a source of displeasure, ultimately becoming a factor exerting pressure on authorities to shut it down (Brătescu, 1970).

Starting in 1900, physician and academician Victor Babeș (1854-1926), knowing how important it was to unite efforts to prevent and reduce the effects of tuberculosis, proposed in a meeting of the "Medical Sciences Society" (Bercuş, 1981) a series of practical measures for wide-scale implementation: isolating patients both in hospitals to prevent disease spread to other patients and in society; developing public educational campaigns to raise awareness of the risks, symptoms, and correct treatment of the disease; sanitizing public spaces such as taverns and installing spittoons managed by public administration; establishing social insurance houses and specialized sanatoriums (following Western models), and even a national "League" (in a form that today would be commonly recognized as a non-governmental organization) to control and reduce disease spread. At the same time, Victor Babeș emphasized the importance of collecting statistical data on the incidence, prevalence, and evolution (mortality and morbidity) of this disease (Bercuş, 1981).

In 1901, Iacob Felix published "The History of Hygiene in Romania in the 19th Century and Its State at the Beginning of the 20th Century," drawing attention to the fact that the

study of hygiene requires consensus and collaboration among multiple medical, natural, and social sciences (Radu, 2012).

Adherence to treatment

Tuberculosis is a social disease, not only because of its capacity to affect a third of the global population (not necessarily in its active form) (Prozorov et al., 2012), but also because it is profoundly dependent on the social context. Poverty, social inequality and marginalization, lack of education and trust in the medical system, difficult access to medical services, drug or alcohol addiction, migrant status, incarceration - all these factors, often beyond the patient's control, significantly contribute to the success or failure of drug treatment, with all the associated consequences (Roberts & Buikstra, 2003). Despite this, patients are often blamed not only for the disease but also for the failure of the treatment or its transmission. Non-compliance with treatment is heavily stigmatized, despite the fact that it is simply inevitable at times, almost to the point of blaming patients for their own illness (Burke, 2011).

Given that more than half of tuberculosis patients do not complete treatment, drug resistance – leading to MDR-TB and XDR-TB, prolonged infections, relapses, or patient deaths may occur, with patient adherence to treatment influenced by many factors, including patient gender, low income, and HIV/AIDS effects (Cuneo & Snider, 1989; Hertz & Schneider, 2019; Mishra et al., 2005; WHO, 2019a; Volmink & Garner, 2007). Even in the case of patients treated for tuberculosis in a timely or partially treated manner, subsequent complications can occur among many patients, such as pulmonary tuberculosis, which can lead to airflow obstruction or restrictive conditions (e.g., Plit et al., 1998). Among the risk factors associated with mortality in tuberculosis patients are anemia, positive sputum smear, smoking, drug-induced hepatitis, diabetes mellitus, drug use, and a history of previous tuberculosis (Alavi-Naini et al., 2013).

To be truly effective, disease control measures must approach therapy in a profoundly "patient-centered" manner, taking into account the patient's living conditions (Roberts & Buikstra, 2003), so that the factors that favor non-compliance are minimized, if not nullified. Designing and evaluating interventions to improve treatment adherence in chronic conditions requires an entirely comprehensive intersectional approach. Fields such as psychology and behavioral economics offer perspectives that can improve the design and implementation of interventions, both financial and otherwise, to enhance the patients' medical conditions and increase their chances of survival (Kimmel & Troxel, 2012).

Despite the availability of effective treatment, tuberculosis tends to remain one of the major infectious diseases worldwide, associated with severe morbidity and mortality, directly correlated with non-adherence to treatment (van den Boogaard et al., 2012). The proportion of patients who do not complete treatment is estimated to be between 16 and 49% (Volmink & Garner, 2007). The main reasons for treatment discontinuation are adverse reactions, cost, stigma associated with the disease, and the belief that the disappearance of symptoms or TB bacilli cultures taken from sputum implies the disease is cured (Munro et al., 2007).

Supporting treatment and directly observing administration can improve adherence, but have not succeeded in reducing the rate of non-compliance to zero. Practices for checking and monitoring adverse effects vary significantly from one region to another, but most guidelines recommend at least one consultation every 2 months and checking clinical response and microbiological profile at the end of treatment (Karumbi & Garner, 2015).

Non-adherence increases the risk of treatment failure and disease recurrence and is considered the most important contributing factor in the emergence of drug-resistant tuberculosis (WHO, 2008). Especially MDR-TB and XDR-TB pose serious threats to public health (van den Boogaard et al., 2012). To improve adherence to TB treatment, the World Health Organization recommends direct observation of treatment administration (DOT) by a trained person (WHO, 2002). However, DOT programs require major investments in human resources, especially when provided in dedicated centers, and there is a risk that they may not be strictly applied when monitoring services are provided by a member of the patient's community (Frieden & Sbarbaro, 2006). Once again, the issue of non-adherence to treatment is not as simple as fixing only one cog in the machine.

Evene if there is a heavy healthcare and treatment monitoring providers, however, risks ignoring an essential factor: the patient. A qualitative study conducted in Tanzania showed that the intention to adhere was the most important determinant of adherence behavior among participants. This intention was preceded by the decision to seek medical care (as opposed to traditional care) and shaped by knowledge and beliefs about anti-TB treatment, as well as the motivation to be cured. The intention to adhere to the treatment regimen helped participants overcome perceived barriers and create a supportive environment for adherence, where the presence of social support played a very important role. Social support was seen as a direct facilitator of adherence to anti-TB treatment, providing emotional and financial support and even directly reminding patients to take their medications. Additionally, social support reinforced patients' intention to maintain treatment adherence through perceived social pressure (van den Boogaard et al., 2012).

The patient's intention to follow the treatment regimen as a major determinant of adherence behavior aligns with two commonly cited health behavior theories: the Theory of Reasoned Action (TRA; Ajzen, 1988) and the Theory of Planned Behavior (TPB; Ajzen, 1991). According to the TRA, the intention to perform a certain behavior is determined by two independent variables: attitudes toward the behavior and subjective norms, i.e., perceived social pressure (Ajzen, 1988). In line with the TRA, the Tanzanian study found that knowledge and beliefs about anti-TB treatment (attitudes toward the behavior) underpinned the patient's intention to adhere, and that social support induced a perceived social pressure to maintain treatment adherence (van den Boogaard et al., 2012).

In TPB, perceived behavioral control (i.e., self-efficacy) is included as a third variable determining behavioral intention (Ajzen, 1991). In contrast to TPB, the Tanzanian study found that the intention to adhere could help overcome perceived barriers to adherence to anti-TB treatment. However, not all barriers to adherence are under volitional control, and thus it would be too simplistic to conclude that all patients who fail to overcome

barriers to adherence lack the intention to adhere. Nonetheless, assessing the patient's intention to adhere is a crucial first step (van den Boogaard et al., 2012).

Adherence to medical treatment, therefore, has multiple facets, being dependent on both external conditions (socio-economic, medical, etc.) and internal factors (psychological, educational, etc.) that make up the individual as a whole. Successful programs to improve adherence have four common characteristics: (1) they provide information about the disease, (2) they use prompts and reminders, (3) they offer positive reinforcement for adherence, and (4) they provide social and possibly economic support for treatment (Haynes et al., 1987).

Adherence to treatment in Romania

In the battle against tuberculosis, Romania is among the European countries with high priority for WHO (de Colmbani et al., 2015). An analysis of tuberculosis incidence rates worldwide indicates that Romania has a high incidence rate (100-249 cases per 100,000 population) compared to other European countries, similar to rates seen in Russia and some countries in Asia and Africa (Dye et al., 1999). A WHO analysis focusing on Romania's national tuberculosis program (de Colombani et al., 2015) suggested that Romania, unlike Western European countries, has a relatively high average length of hospital stay for tuberculosis patients (35 days) and a high hospitalization rate (85%). However, many patients do not reach the follow-up phase of treatment, indicating a low success rate in retaining patients in treatment. Less than 20% of tuberculosis patients were successfully treated (2008-2011), compared to over 60% and even over 75% in other countries in the region (Stillo, 2017). There has been only a modest 35% increase over time, while personal poverty, alcohol consumption, and other social factors cannot be used as a scapegoat to fully explain why people still die from a treatable disease.

A comparative study between Romania and the Republic of Moldova (Rais et al., 2016) underscored the importance of tuberculosis as a priority public health issue for both countries, each making significant legislative and management efforts aligned with WHO guidelines. Budgets allocated to tuberculosis prevention, surveillance, and control programs are low in both countries, and the high financial burden of tuberculosis shares common culprits: low living standards, alcoholism, poor diet, migration, increasing homelessness, etc. An analysis of factors influencing tuberculosis treatment success in several European countries (Falzon et al., 2005) found that treatment success was associated with younger age, female sex, and non-multi-drug resistance. Although initially considering the Romanian population, the Romanian cohort was excluded due to a large number of failed cases, cases that were seemingly still in treatment, and the exclusion of foreigners altogether. The study emphasized the importance of prioritizing adherence enhancement and improving care for the elderly population, suggesting that variations in treatment success between countries are linked to insufficient data monitoring and the effectiveness of national control programs.

Financial support

Circling back to the interaction between poverty and TB, it is important to delve deeper into the concept of financial support and what its implications are for TB patients. Tuberculosis, being a disease that significantly affects socially and economically disadvantaged individuals, makes financial support a crucial factor for the satisfaction and treatment compliance of those with tuberculosis (e.g., Palha et al., 2012; Orlandi et al., 2019; WHO, 2002). It has been shown that even a small financial payment in a tuberculosis clinic (e.g., Malotte, Rhodes, & Mais, 1998; Pilote et al., 1996) increased return rates to the clinic among active drug users (from 33% to 93%) and homeless individuals (from 53% to 84%).

Taking this into account, we cannot limit the adherence process to being solely the patient's responsibility and a completely individual act, but rather we should consider it as being associated with the social production and reproduction of processes aimed at social inclusion and living and working conditions (Orlandi et al., 2019). Thus, incentives such as a basic food basket or transport vouchers become important for developing consistent and lasting connections between the patient and the medical team in order to integrate the patient into the treatment process (Orlandi et al., 2019). On the other hand, although these incentives are useful for increasing adherence, taking measures focused on transforming the situation of tuberculosis patients (and not just remedying certain aspects) could be targeted through public policies with the aim of truly changing the living conditions of these patients (Orlandi et al., 2019; Stillo, 2012). The focus should not be narrowed to mere survival, rather it should be expanded towards allowing patients to truly live their lives.

A recent analysis explores the reasons why tuberculosis patients in Eastern Europe and Central Asia adhere to or do not adhere to prescribed treatment (Auer et al., 2020). In Romania, in addition to other services, social workers and psychologists from multidisciplinary teams specific to tuberculosis treatment offer food or transport vouchers to tuberculosis patients. As Stillo (2012) observes, incentives offered to Romanian tuberculosis patients (e.g., food vouchers and bus tickets) significantly increased their adherence to treatment, being an important aid especially for the working class and those with low incomes. However, the author suggests that the funding is insufficient, which causes individuals with lower living standards to relapse or have poor treatment outcomes in the absence of social support. Thus, financial incentives prove to be an effective yet unreliable solution.

Similarly, an analysis by Beith, Eichler, and Weil (2007) regarding tuberculosis detection and treatment based on incentives indicated that the main forms of incentives offered to Romanian patients consist of providing transportation and food vouchers. Gift vouchers offered to providers involved in treating tuberculosis patients are provided based on a series of conditions: new cases confirmed by microscopy, the DOT rate in patients with positive sputum, and cases of patients who missed DOT visits. These gift or food vouchers, totaling 6 per month, can be used to purchase food and personal hygiene products. The number of vouchers received by the patient is directly proportional to the number of DOT meetings and treatment compliance. This scheme for tuberculosis patients indicates through its preliminary results a high increase in DOT attendance and is granted by the

Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) and managed by DOW, the National Tuberculosis Programs, and the Red Cross. Transport provision for patients coming to the clinic was funded by the SOROS foundation (only until 2002) and managed by the National Tuberculosis Programs and DOT nurses. Although there were no initial baseline data, treatment adherence increased by 95% as a result of the transport vouchers offered to tuberculosis patients and decreased by 80% when the program ended.

Financial incentives

Various types of financial incentives have been proposed as mechanisms to improve treatment adherence. Reducing or eliminating copayments is an important component (Doshi et al., 2009), involving structural changes to improve access to medications and consequently adherence. Several studies have evaluated the correlation between reducing copayments for long-term prescribed medications and treatment adherence. The first evidence of this correlation comes from an observational study in which adherence worsened in patients subjected to increased copayments for prescriptions (Chernew et al., 2007). This study also showed overall reductions in adherence over time for all subjects (Chernew et al., 2008). Additionally, the effects of increasing copayments, compared to reducing them, seem to be asymmetric: increases in copayments have a negative effect on adherence, while reductions in copayments may not bring comparable benefits (Tversky and Kahneman, 1991). These observations, as well as others, have led to the development of other interventions based on concepts derived from behavioral economics, such as financial incentives (Kimmel and Troxel, 2012).

Financial incentives have been shown to influence health-related behaviors in various contexts; for example, utilization rates of medical services, such as gynecological consultations following an abnormal Pap smear (Marcus et al, 1998), postpartum visits for teenage mothers (Stevens-Simon et al., 1994), or the return rate of HIV patients for discussing PPD test results (Chaisson et al., 1996). An analysis of 11 randomized studies examining the effect of financial incentives found that in 10 out of the 11 studies, financial incentives promoted adherence better than any tested alternative, leading to better blood pressure control, higher rates of medical consultations, and higher immunization rates. A more recent analysis of 47 studies on financial incentives found that different incentive mechanisms were effective in changing behavior. Effectiveness varied depending on the size and type of payment, but few studies examined long-term effects or cost-effective methods (Kane et al., 2004).

Studies on the effects of financial incentives on unhealthy behaviors such as alcohol or drug use (Higgins and Silverman, 1999) are of interest not only because these behaviors are associated with a higher risk of developing tuberculosis, but also because such behaviors are difficult to change and require continuous reinforcement. In controlled environments such as drug treatment programs, financial incentives have been extremely effective in modifying behavior and leading to higher retention and abstinence rates in the program (Higgins, 1999). This strategy, known in the literature as contingency management (Higgins & Silverman, 1999), can substantially improve the adoption and

adherence to healthy behaviors. For example, a randomized clinical trial among adults using cocaine found that progressively higher payments for urine samples consistently indicating the absence of drugs led to significant improvements in treatment completion and abstinence. This effect continued even after the incentive period ended showing that financial incentives can have long-term behavioral changes. This study shows the clear effectiveness of incentives and also demonstrates the importance of frequent monitoring and feedback (Higgins, 1999).

Lottery-based incentives have also proven effective as a way to modify health-related behaviors (Kane et al., 2004). This approach was inspired by the success of the Dutch postcode lottery, where not individuals but winning postcodes are selected, and those living in the area who have purchased a ticket automatically receive a prize (Zeelenberg & Pieters, 2004). Several perspectives from behavioral economics combine to explain the lottery's success and suggest ways to maximize their effectiveness. Firstly, research indicates significant effects even in the case of small rewards and penalties if they occur immediately (Kimmel & Troxel, 2012). Adherent patients, for example, should be able to quickly find out if they have won a prize. Secondly, people are motivated by past reward experiences in relation to the prospect of future rewards (Camerer and Ho, 1999) and are emotionally attracted to small probabilities of large rewards (Loewenstein et al., 2001). Lotteries can be adapted to offer frequent small wins (e.g., a 1 in 5 chance for a $10 reward) and rare large wins (e.g., a 1 in 100 chance for a $100 reward). Frequent small rewards enhance the attractiveness of lotteries by providing intermittent positive reinforcement (Kimmel & Troxel, 2012). Thirdly, decision-making research has found that the desire to avoid regret is a strong force in making decisions under risk (Connolly & Butler, 2006), so by providing non-adherent patients with feedback about what they would have won if they had been adherent, the scheme can maximize regret and stimulate the desire to avoid it among those who did not achieve positive results. In the Dutch postcode lottery, those who fail to buy a ticket find out they would have won if they had bought one; similarly, non-adherent patients can be informed they would have won a prize if they had been adherent (Kimmel & Troxel, 2012).

Anticipated regret has also been shown to affect preventive behavior in other contexts, such as significantly increasing vaccination use among people who regretted not getting vaccinated the previous year and then fell ill (Chapman & Coups, 2006). Finally, the chance of not receiving the prize they would have won due to non-adherence leverages loss aversion (Chernew et al., 2007). Loss aversion has been used to explain many inconsistencies in traditional economic choice models and has improved understanding in areas involving choice under uncertainty (Rizzo & Zeckhauser, 2003).

Given that tuberculosis is the infectious disease emblematic of the association with poverty and social exclusion (Dye et al., 2009), with consistently higher incidence in marginalized social groups (Oxlade & Murray, 2012), we can infer that financial incentives could be a key element in increasing treatment adherence.

In 2011, the Brazilian Ministry of Health aligned with other social assistance agencies to concertedly address both tuberculosis and other diseases of poverty through conditional financial incentives, aimed at improving case detection and treatment access,

preventing reinfection or relapse, social reintegration, and physical rehabilitation (Torrens et al., 2016). Conditional financial incentive programs are very popular social protection measures designed to lift people out of extreme poverty and interrupt the intergenerational transmission of poverty by improving material conditions and access to education and health services (UNDP, 2014).

Since 2003, Brazil has been running the Bolsa Familia Program (BFP), the national conditional financial incentives program, which aims to improve the human capital of poor citizens through increased use of public services and interruption of intergenerational poverty transmission (Soaeres et al., 2007). An analysis of health status data of the beneficiary population, correlated with socio-economic data (Torrens et al., 2016), concluded that conditional financial incentives likely contributed to a 7% increase in tuberculosis cure rates in Brazil. The percentage rises to 11% for patients not enrolled in the Brazilian DOTS program. However, it should be noted that this result is only a correlation, as before 2011, the financial incentive program did not specifically target families affected by tuberculosis, with selection criteria based solely on the socio-economic conditions of the households (Torrens et al., 2016).

It should not be surprising that higher cure rates were observed among tuberculosis patients not enrolled in DOTS: in Brazil, TB patients are enrolled in the DOTS program only if they are considered capable of completing their treatment. It could be argued that among those deemed ineligible, the contribution of financial incentives is higher than in those who receive standard care from the outset. In other words, among those who do not even receive standard TB care (based on free diagnosis and treatment and DOTS used to enhance treatment compliance), the role of social protection interventions may be proportionally greater (Torrens et al., 2016).

Brazil's example indicates the potential of conditional financial incentives to increase the likelihood of tuberculosis cure, mainly by influencing health-seeking behaviors and improving individuals' response to treatment (Torrens et al., 2016). In the first case, it can be postulated that with better access to health care services (access often conditioned on the provision of the incentive), people may become indirectly better informed about diagnostic and treatment options as well as TB symptoms, thus becoming more inclined to promptly access medical services. In the second case, it is likely that this type of program increases TB cure rates by improving food security and nutritional status among intervention beneficiaries and, therefore, the immune competence of patients.

Financial assistance has also been shown to improve TB treatment outcomes by alleviating the costs imposed on households affected by TB (Wingfield et al., 2014). In this latter case, it can be imagined that by avoiding further impoverishment of the household, financial incentives can help reduce the risk of malnutrition and the psychosocial stress associated with poverty.

Financial incentives can take various forms, they don't need to be strictly monetary. For example, in Singapore, a local assistance scheme for adherence to anti-TB treatment in the form of DOT offered needy patients supermarket vouchers to complete their treatment (Tan Tock Seng Hospital, 2015).

Household income and employment status

A study conducted by Mishra et al. (2005) indicated a significant connection between the risk of non-adherence to tuberculosis treatment and individuals who are unemployed, have low occupational status, and a low annual income. Similarly, Xu et al. (2009) suggest that being unemployed alongside the high costs associated with tuberculosis can exert major financial pressures on families and lead patients to discontinue treatment.

The first support group for anyone that is burdened with TB to fall back on is their own family. Unfortunately, the reality is that household income in Romania is not high enough to facilitate a comfortable living. This fact, coupled with the possibility of contracting the disease from an affected family member, are risk factors that greatly increase the risk of tuberculosis (Ndishimye et al., 2017). Social protection expenditures in 2005 accounted for 28.8% of the gross domestic product (GDP) in Romania (Berger et al., 2010). Most expenditures were for social insurance and family benefits. However, in 2001, conditions for receiving unemployment benefits were tightened while family allowances were reduced. Thus, most TB patients could not afford to be healthy even before the manifestation of the disease. More than just a disease, TB can be a prison for the patient and the family that cannot financial support their treatment.

Although most studies indicate that unemployment can be a risk factor for non-adherence to treatment (e.g., Bhatia, Dranyi, & Rowley, 2002; Jakubowiak et al., 2008; Mishra et al., 2005; Mittal & Gupta, 2011; Xu et al., 2009, etc.), evidence contradicting these results has been identified, suggesting that individuals with tuberculosis who are unemployed may actually be more adherent to treatment (e.g., Kulkarni et al., 2013). People with tuberculosis and no job may attend DOT centers and take their medications more often as a result of not having time constraints (Kulkarni et al., 2013). It is also worth noting that the majority of individuals in the unemployed group were women, and generally, women (who often have a social and familial support role during anti-tuberculosis treatment) are considered to be more adherent to treatment compared to men (Balasubramanian et al., 2004; Jakubowiak et al., 2008; Kulkarni et al., 2013; WHO, 2017).

Given that more than half of tuberculosis patients do not complete treatment, drug resistance – leading to MDR-TB and XDR-TB, prolonged infections, relapses, or patient deaths may occur, with patient adherence to treatment influenced by many factors, including patient gender, low income, and HIV/AIDS effects (Cuneo & Snider, 1989; Hertz & Schneider, 2019; Mishra et al., 2005; WHO, 2019a; Volmink & Garner, 2007). Even in the case of patients treated for tuberculosis in a timely or partially treated manner, subsequent complications can occur among many patients, such as pulmonary tuberculosis, which can lead to airflow obstruction or restrictive conditions (e.g., Plit et al., 1998). Among the risk factors associated with mortality in tuberculosis patients are anemia, positive sputum smear, smoking, drug-induced hepatitis, diabetes mellitus, drug use, and a history of previous tuberculosis (Alavi-Naini et al., 2013).

Completing treatment is a major goal in treating tuberculosis patients and signifies high patient adherence, which can be intensified through the use of incentives unlike in the

case of patients who are not rewarded in any way (Davidson et al., 2000; Schluger et al., 1995). Thus, while employability may still require further study in order to truly grasp the causal relation between it and adherence to treatment, financial incentives cannot be dismissed as important factors in increasing overall adherence to treatment.

Public policies and programs

At the level of Romanian public policies, support programs, or even just disease detection, tuberculosis patients face a lack of funds and public awareness regarding the challenges they encounter (Stillo, 2012). In addition to these issues, the shortage of tuberculosis medications significantly affects individuals diagnosed with this disease, compounded by social stigma that attributes incurable and shameful characteristics to the illness (Stillo, 2012).

The World Health Organization (WHO, 2022) provides specific treatment guidelines for those resistant to drug therapy, guidelines that also guide agents involved in public policies at the level of Ministries of Health or those implementing national programs for tuberculosis patients. In Romania, through the Minister of Health's order, the Technical Assistance and Management Unit (UATM) within the National Program for Prevention, Surveillance, and Control of Tuberculosis (PNPSCT) ensures the coordination of activities concerning technical and methodological aspects with the help of a pneumology specialist with at least 5 years of experience in tuberculosis (Ministry of Health of Romania, 2015).

The response of the Romanian health system to reduce tuberculosis-related difficulties has been implemented in accordance with the National Strategy for Tuberculosis Control in Romania 2015-2020, approved by Government Decision No. 121/2015. PNPSCT was established following prescriptive legislation to regulate the implementation of national public health programs funded from the state budget, specifically from the Ministry of Health.

Patients with drug-resistant tuberculosis receive substantial assistance from NGOs, their communities, and civil society groups (Auer et al., 2020), all of which provide various services: administrative support, transport vouchers, food, etc. For patients with pulmonary tuberculosis, smoking poses a major health challenge in the Romanian population, even among hospitalized patients (Ndishimye et al., 2017). From this perspective, intensifying anti-smoking campaigns would be advisable, especially since free smoking cessation services are not readily available to most Romanian patients (e.g., Ndishimye et al., 2017).

Quantitative analysis

As the research on financial incentives in relation to adherence to treatment for MDR-TB and XDR-TB is almost non-existent, I decided to add my own contribution in order to create grounds for further academic discussion surrounding treatment in Romania.

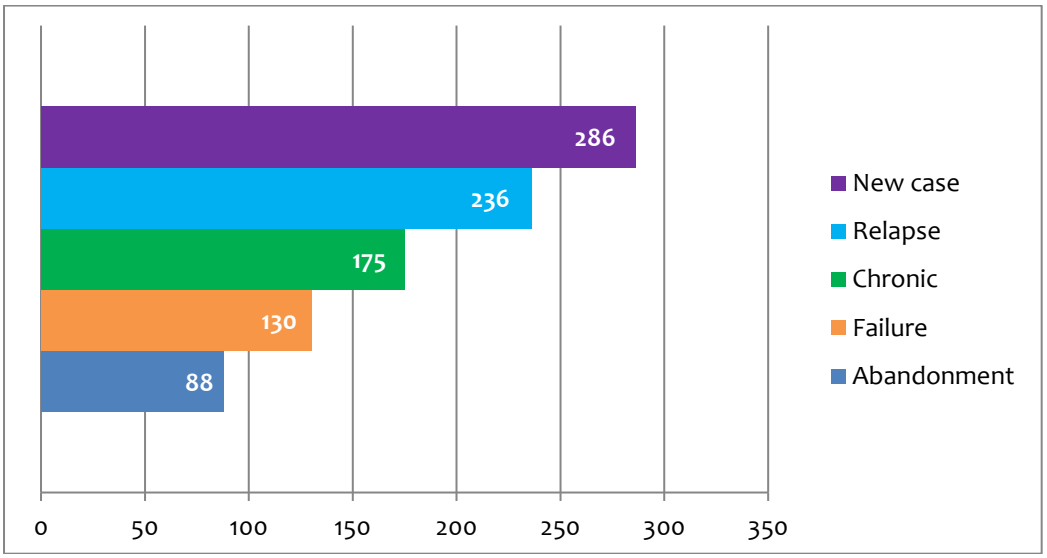
The analyzed database was created by completing a questionnaire designed to gather the necessary information for including patients in the project "M2I3S7 - Improving TB MDR/XDR control by ensuring uninterrupted, complete, and quality treatment with

medications procured through GLC (DOTS-Plus)." At the initiation of tuberculosis treatment, patients were informed about the project, signed GDPR consent for the use of personal data, and completed the questionnaire either personally or with the assistance of medical staff (nurses/doctors). Some of the data were retrieved from the information system.

The analyzed database has 914 cases, distributed as such: 700 male respondents (76.6%) and 214 female ones (23.4%). As for the age distribution, 11 patients fell into the 0-17 years category (1.2%), 128 into the 18-29 years category (14%), 417 into the 30-49 years category (45.6%) and, lastly, 258 into the 50+ years category (39.1%). Regarding the type of tuberculosis, the most identified cases were for MDR tuberculosis with a staggering 840 cases while XDR tuberculosis cases were on the lower end with 74 cases.

Out of the total 914 cases, 286 (31.3%) were new. This number proved to be the majority of cases, indicating that most patients that entered the program had been recently diagnosed with TB. This situation is representative of the aggravated situation in Romania where TB cases are growing at a both rapid and consistent pace (Figure 1).

Figure 1. Distribution patients' case profile



Shortly behind the category of new cases, another numerically significant category is that of those who relapsed with 235 patients (25.7%) that were previously treated for TB but relapsed. Third in line is the category of chronic patients with 175 cases (19.1%), representing those with a long lasting or persistent form of TB. Moreover, 130 cases (14.2%) fell into the failure category, representing those that had not previously finalized their treatment or did not adequately respond to the prescribed therapeutic interventions.

This analysis provides an overview of the distribution of cases in different initial categories and helps to understand the composition of the patient sample in terms of previous treatment history and disease status at the start of the program. This information can be useful for identifying potential risk factors, targeting interventions, and allocating resources based on the predominant case categories.

When analyzing the distribution by gender within each age group (Table 1), a notable shift is observed from a relatively balanced distribution in younger age groups to a higher proportion of men in older age groups. This suggests that gender disparities in tuberculosis prevalence become more pronounced with age.

Table 1. Correlation between age and gender of TB patients

			Patient Gender		
			Masculine	Feminine	Total
Age categories	0-17 years	Count	6	5	11
		% within age category	54.5%	45.5%	100.0%
		% within patient's gender	0.9%	2.3%	1.2%
	18-29 years	Count	66	62	128
		% within age category	51.6%	48.4%	100.0%
		% within patient's gender	9.4%	29.0%	14.0%
	30-49 years	Count	324	93	417
		% within age category	77.7%	22.3%	100.0%
		% within patient's gender	46.3%	43.5%	45.6%
	50+ years	Count	304	54	358
		% within age category	84.9%	15.1%	100.0%
		% within patient's gender	43.4%	25.2%	39.2%
Total		Count	700	214	914
		% within age category	76.6%	23.4%	100.0%
		% within patient's gender	100.0%	100.0%	100.0%

For the age category 18-29 years, a notable change in gender distribution can be observed. The proportion of men (51.6%) and women (48.4%) becomes almost equal. This change in gender balance can be influenced by a combination of biological and social factors that emerge during adolescence and young adulthood.

Biologically, hormonal changes associated with puberty and reproductive development can have a differential impact on susceptibility and immune response to tuberculosis infection in men and women. For example, the female sex hormone estrogen has been shown to have immunomodulatory effects that could influence the risk and progression of tuberculosis.

Socially, gender-specific behaviors and exposures that become more prominent in this age group can contribute to the changing gender distribution. For example, young men may be more likely to engage in high-risk behaviors such as smoking or substance abuse, which can increase their vulnerability to tuberculosis.

Gender disparity becomes more evident for older age categories, with men accounting for 77.7% of cases in the 30-49 years age category and 84.9% in the 50+ years age category. This disproportionate prevalence of tuberculosis among older men may be influenced by a combination of factors, including cumulative exposure to occupational hazards, preventive health-seeking behaviors, and social norms related to masculinity. Men may be more likely to work in high-risk environments, engage in behaviors that increase

their vulnerability to tuberculosis (e.g., smoking), and delay seeking medical care due to social norms.

The age distribution by gender reveals a disproportionate prevalence of tuberculosis across different age categories and its potential social consequences. The 30-49 years age category represents the largest proportion of cases among both men (46.3%) and women (43.5%), highlighting the substantial impact of tuberculosis on adults in their prime working years.

This finding has significant implications for the social and economic well-being of individuals, families, and communities. Adults in this age group are often the primary breadwinners and caregivers, playing crucial roles in both the formal and informal sectors of the economy. The high prevalence of tuberculosis in this population can lead to reduced labor productivity, as individuals may be unable to work or may have reduced efficiency due to the debilitating effects of the disease. This, in turn, can place financial pressures on families, as income loss and healthcare costs can burden households and exacerbate existing socio-economic inequalities.

Examining the way in which stimulation mechanisms influence patients' conformity to therapeutic interventions prescribed for MDR/XDR tuberculosis.

Data suggests that adherence to the prescribed therapetuic interventions represents a difficult challenge for the patients.

More than a third of the patients (35.4% - 324 cases) did not adhere to the program at all, which is a concerning finding and highlights the need for interventions to improve adherence. Approximately 28% (255 cases) of the patients adhered to the program to some extent, but to less than half of the prescribed interventions. This indicates that although these patients engaged with the program, their levels of adherence were suboptimal. Just over a third of the patients (36.7% - 335 cases) adhered to more than half of the prescribed interventions, with some potentially achieving full adherence. This group represents the patients who demonstrated relatively better adherence to the program.

The analysis reveals a clear need to investigate the factors contributing to low adherence levels and to develop specific strategies to improve patient adherence. This might involve examining barriers to adherence, such as side effects, accessibility to healthcare, social stigma, or lack of education and support for patients.

The correlation between the number of tickets received in the program and the treatment status at the end of the program (Table 2) has a coefficient of 0.137, at a significance level of less than 0.01. The Pearson correlation analysis reveals a weak positive linear relationship between the number of tickets received in the program and the treatment status at the end of the program. This suggests that patients who receive more tickets tend to have slightly more successful treatment outcomes, although the relationship's intensity is relatively weak.

Table 2 provides evidence for a positive association between the incentive mechanism (number of tickets) and treatment success. However, it is important to note

the correlation coefficient of 0.137, which is relatively small, indicating a weak relationship. Although the relationship is statistically significant, its practical significance may be limited.

Table 2. Correlation between number of tickets received in the program and treatment status at the end of the program

		Number of tickets received in the program	Treatment status at the end of the program
Number of tickets received in the program	Pearson Correlation	1	.137**
	Sig. (2-tailed)		.000
	N	914	914
Treatment status at the end of the program	Pearson Correlation	.137**	1
	Sig. (2-tailed)	.000	
	N	914	914
**. Correlation is significant at the 0.01 level (2-tailed).			

Nevertheless, the significant positive correlation provides some support for the potential role of incentive mechanisms in promoting treatment success. Further research may be needed to explore the effectiveness of incentive-based interventions combined with other strategies to optimize treatment outcomes in this population.

The correlation between the degree of treatment adherence and the initial case type (Table 3) is negative, with a coefficient of -0.065 and statistically significant (p=0.05). This coefficient is negative, indicating a very weak inverse relationship between the degree of adherence and the initial case category. In other words, as one variable increases, the other tends to decrease slightly. This suggests that higher categories of adherence are slightly associated with lower categories of the initial case, but the relationship is weak and other factors may play a more significant role.

Correlating the patient's employment status with maintaining and/ or increasing adherence to treatment.

Based on the correlation coefficient of -0.044 between the patient's occupation and the treatment status at the end of the program (Table 3), there is a very weak negative relationship between these two variables. Although this suggests that a patient's occupation has a weak influence on treatment outcome, it still indicates that employed patients had better treatment results.

There are several explanations for why individuals with a job might have better tuberculosis treatment outcomes compared to those who are unemployed. Firstly, being employed often provides individuals with a sense of social support and integration. The workplace offers opportunities for interaction with colleagues, forming relationships, and belonging to a social network. This support system can offer emotional and practical assistance during the treatment process, encouraging adherence and helping individuals cope with the challenges of managing their illness. Moreover, social integration through

work can reduce feelings of isolation and stigmatization associated with tuberculosis, which can be barriers to seeking and adhering to treatment.

Table 3. Correlating patient's employment status and treatment status at the end of the program

		Patient's employment status	Treatment status at the end of program
Patient's employment status	Pearson Correlation	1	-.044
	Sig. (2-tailed)		.188
	N	914	914
Treatment status at the end of program	Pearson Correlation	-.044	1
	Sig. (2-tailed)	.188	
	N	914	914

Secondly, having a job typically provides individuals with economic stability and access to resources. A stable income and financial resources can facilitate access to healthcare services, medications, and other necessary resources for effective tuberculosis treatment. Employed individuals might also have health insurance benefits through their job, covering the costs of medical consultations, diagnostic tests, and medications. This financial support can reduce the burden of treatment expenses and improve adherence to treatment. Economic stability also allows individuals to maintain a better quality of life, including adequate nutrition, housing, and transportation, which are important factors for successful treatment.

Thirdly, a job often provides a structured daily routine and a sense of purpose. A regular schedule can help individuals establish and maintain healthy habits, including taking medications on time and attending medical appointments. The structure and responsibility associated with work can motivate individuals to prioritize their health and adhere to treatment regimens to maintain job performance and continue to support themselves and their families.

Fourthly, having a job contributes to a positive self-identity and a sense of self-respect. It provides individuals with a sense of accomplishment, productivity, and contribution to society. Positive self-perception and mental well-being can enhance the motivation to take care of one's health and adhere to treatment. Individuals who feel valued might be more likely to prioritize their health and actively participate in their treatment journey. Additionally, employment can offer a sense of normalcy and help individuals maintain a positive outlook during the challenging process of tuberculosis treatment.

Lastly, workplaces often offer health education programs, wellness initiatives, and access to health-related information. Employed individuals might have more opportunities to learn about tuberculosis, its treatment, and the importance of adherence. Health knowledge gained through workplace resources and interactions with colleagues can empower individuals to make informed decisions about their health, communicate effectively with healthcare providers, and actively engage in the treatment process.

It is important to note that while having a job can contribute to better tuberculosis treatment outcomes, the relationship is complex and multifaceted. Other factors such as job type, working conditions, professional demands, and workplace policies can also influence treatment adherence and outcomes. Additionally, socioeconomic disparities, discrimination, and structural barriers can further hinder access to healthcare and treatment adherence, even among employed individuals.

Conclusion

Tuberculosis (TB), historically romanticized and misunderstood, has been a significant public health challenge globally and particularly in Romania. The disease, caused by Mycobacterium tuberculosis, has deep socio-economic roots, impacting the most vulnerable populations. In Romania, high mortality rates from TB have been recorded since the late 19th century, often linked to poor living conditions and inadequate healthcare access.

Financial incentives have emerged as a crucial strategy in enhancing treatment adherence for TB, especially multidrug-resistant (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB). These incentives aim to address the socio-economic barriers that hinder patients from completing their treatment regimens. Studies have shown that financial support can significantly improve treatment adherence, reducing the rates of non-compliance which is vital for controlling the spread of TB and preventing the emergence of drug-resistant strains.

The historical analysis of TB in Romania underscores the persistent challenges faced due to economic disparities and insufficient public health measures. In addition to that, my own quantitative analysis supports the importance of financil incentives stemming from factors such as age related difficulties or employment status. Despite advancements in medical treatments and the implementation of programs to improve TB management, Romania continues to struggle with high incidence and mortality rates. Financial incentives, therefore, play a critical role in the current public health strategy, offering not only economic relief to patients but also enhancing the overall effectiveness of TB treatment programs.

In conclusion, the integration of financial incentives into TB treatment protocols in Romania represents a necessary evolution in combating this age-old disease. By addressing both the medical and socio-economic dimensions of TB, these incentives help ensure better adherence to treatment, ultimately contributing to the reduction of TB prevalence and improving public health outcomes in Romania.

REFERENCES

Agarwal, Y., Chopra, R., Gupta, D. and Sethi, R. (2017). The tuberculosis timeline: Of white plague, a birthday present, and vignettes of myriad hues. *Astrocyte*, [online] 4(1), p.7. doi:https://doi.org/10.4103/2349-0977.217662.

Ajzen, I. (1988). *Attitudes, personality, and behavior*. Chicago: Dorsey Press

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211

Alavi-Naini, R., Moghtaderi, A., Metanat, M., Mohammadi, M., & Zabetian, M. (2013). Factors associated with mortality in tuberculosis patients. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*, 18(1), 52

Andreescu, O. (2013), Tuberculoza, boală socială în prima jumătate a secolului xx în românia (1901÷ 1940). *Brasov Medical Journal/Jurnal Medical Brasovean*, (2)

Auer, C., Mazitov, R., Makhmudov, A., Pirmahmadzoda, B., Skrahina, A., Dobre, A., Sécula, F., Bosch-Capblanch, X., Van den Boom, M., Migliori, G. B., Mdivani, N., Yassin, M. A. (2020). Factors contributing to drug-resistant tuberculosis treatment outcome in five countries in the Eastern Europe and Central Asia region. *Monaldi archives for chest disease [Archivio Monaldi per le malattie del torace]*, 90, 1235

Balasubramanian, R., Garg, R., Santha, T., Gopi, P. G., Subramani, R., Chandrasekaran, V., Thomas, A., Rajeswari, R., Anandakrishnan, S., Perumal, M., Niruparani, C., Sudha, G., Jaggarajamma, K., Frieden, T. R., Narayanan, P.R. (2004). Gender disparities in tuberculosis: report from a rural DOTS programme in south India. *The International Journal of Tuberculosis and Lung Disease*, 8(3), 323-332

Banu G. – Eugenia (1943). *Îndrumător pentru activitatea medicilor şi studenților în medicina în mediul rural*, Tipografia „Astra"

Bercuş, C. I. (1981). *Pagini din trecutul medicinii româneşti*. Editura Medicală, Bucureşti

Berger, D., Butu, C., Dev, A., Olsavszky, V., Pana, A., & Tripathi, V. (2010). 15. *Romania: controlling TB among the Roma–a community approach. Poverty and social exclusion in the WHO European Region: health systems respond*, 147

Bhatia, S., Dranyi, T., & Rowley, D. (2002). Tuberculosis among Tibetan refugees in India. *Social Science & Medicine*, 54(3), 423-432

Brătescu, G. (1970). *Sănătatea Bucureştilor (1866-1944)*. Editura Medicală, Bucureşti

Burke, S. (2011). Tuberculosis: Past and Present. *Reviews In Anthropology*, 40(1), 27-52. doi: 10.1080/00938157.2011.547754;

Camerer, C., Ho, T-H. (1999). Experience-weighted attraction learning in normal form games. *Econometrica*, 67, 837–74

Chaisson, R.E., Keruly, J.C., McAvinue, S., Gallant, J.E., Moore, R.D. (1996). Effects of an incentive and education program on return rates for PPD test reading in patients with HIV infection. *Journal of Acquired Immune Deficiency Syndrome and Human Retrovirology*, 11(5), 455–9

Chapman, G.B., Coups, E.J. (2006). Emotions and preventive health behavior: Worry, regret, and influenza vaccination. *Health Psychology*, 25(1), 82–90

Chernew, M.E., Rosen, A.B., Fendrick, A.R. (2007). Value-based insurance design. *Health Affairs*, 26(2), w195–203

Chernew, M.E., Shah, M.R., Wegh, A., et al. (2008). Impact of decreasing copayments on medication adherence within a disease management environment. *Health Affairs*, 27(1), 103–12

Connolly, T., Butler, D.U. (2006). Regret in economic and psychological theories of choice. *Journal of Behavioral Decision Making*, 19(2), 148–58

Cuneo, W. D., & Snider Jr, D. E. (1989). Enhancing patient compliance with tuberculosis therapy. *Clinics in Chest Medicine*, 10(3), 375-380

Daniel, V.S. and Daniel, T.M. (1999). *Old Testament Biblical References to Tuberculosis. Clinical Infectious Diseases*, [online] 29(6), pp.1557–1558. doi:https://doi.org/10.1086/313562.

Davidson, H., Schluger, N. W., Feldman, P. H., Valentine, D. P., Telzak, E. E., & Laufer, F. N. (2000). The effects of increasing incentives on adherence to tuberculosis directly observed therapy. *The International Journal of Tuberculosis and Lung Disease*, 4(9), 860-865

de Colombani, P. (Editor) et al. (2015). *Review of the national tuberculosis programme in Romania*, 10–21 March 2014. WHO Regional Office for Europe

Higgins, S.T., Silverman, K. (1999). Motivating Behavior Change among Illicit Drug Abusers: Research on Contingency Management Interventions. *American Psychological Association*, Washington, DC

Doshi, J.A., Zhu, J., Lee, B., Kimmel, S., Volpp, K.G. (2009). Impact of a prescription copayment increase on lipid lowering medication adherence in Veterans. *Circulation*, 119, 390–7

Dye, C., Scheele, S., Pathania, V., & Raviglione, M. C. (1999). Global burden of tuberculosis: estimated incidence, prevalence, and mortality by country. *Jama*, 282(7), 677-686

European Centre for Disease Prevention and Control (2024). *WHO Regional Office for Europe. Tuberculosis surveillance and monitoring in Europe 2024 – 2022 data*. Copenhagen: WHO Regional Office for Europe and Stockholm: European Centre for Disease Prevention and Control; 2024. Licence: CC BY 3.0 IGO:

Falzon, D., Le Strat, Y., Belghiti, F., & Infuso, A. (2005). Exploring the determinants of treatment success for tuberculosis cases in Europe. *The International Journal of Tuberculosis and Lung Disease*, 9(11), 1224-1229

Frieden, T. R., & Sbarbaro, J. A. (2006). Family observation of antituberculosis treatment. *Lancet*, 367, 2055-2056. doi:10.1016/S0140-6736(06)68915-0

Golli, A. L., Nițu, M. F., Turcu, F., Popescu, M., Ciobanu-Mitrache, L., & Olteanu, M. (2019). Tuberculosis remains a public health problem in Romania. *The International Journal of Tuberculosis and Lung Disease*, 23(2), 226-231

Haynes, R.B., Wang, E., da Mota-Gomes, M. (1987). *A critical review of interventions to improve compliance with prescribed medications. Patient Education and Counselling*, 10, 155–66

Hertz, D., & Schneider, B. (2019, March). Sex differences in tuberculosis. In *Seminars in immunopathology* (Vol. 41, pp. 225-237). Springer Berlin Heidelberg

Higgins, S.T. (1999). *Applying behavioral economics to the challenge of reducing cocaine abuse. The Economic Analysis of Substance Use and Abuse*. NBER, Cambridge, MA, pp. 157–74

Jakubowiak, W. M., Bogorodskaya, E. M., Borisov, S. E., Danilova, I. D., Lomakina, O. B., & Kourbatova, E. V. (2008). Impact of socio-psychological factors on treatment adherence of TB patients in Russia. *Tuberculosis*, 88(5), 495-502

Kane, R.L., Johnson, P.E., Town, R.J., Butler, M. (2004). A structured review of the effect of economic incentives on consumers' preventive behavior. *American Journal of Preventative Medicine*, 27(4), 327–52

Karumbi, J., & Garner, P. (2015). *Directly observed therapy for treating tuberculosis*. Cochrane Database of Systematic Reviews. https://doi.org/10.1002/14651858.cd003343.pub4

Kimmel, S. E., & Troxel, A. B. (2012). Novel incentive-based approaches to adherence. *Clinical Trials*, 9(6), 689–695. https://doi.org/10.1177/1740774512453520

Kulkarni, P. Y., Akarte, S. V., Mankeshwar, R. M., Bhawalkar, J. S., Banerjee, A., & Kulkarni, A. D. (2013). Non. Adherence of new pulmonary tuberculosis patients to anti. Tuberculosis treatment. *Annals of Medical and Health Sciences Research*, 3(1), 67-74

Loewenstein, G., Weber, E.U., Hsee, C.K., Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127(2), 267–86

Malotte, CK, Rhodes F, Mais KE (1998). "Tuberculosis screening and compliance with return for skin test reading among active drug users". *American Journal of Public Health*, 88(5), 792-6.

Manoli-Skocay, C. (2015). *A Gentle Death: Tuberculosis in 19th Century* Concord | Special Collections | Concord Free Public Library. [online] concordlibrary.org. Available at: https://concordlibrary.org/special-collections/essays-on-concord-history/a-gentle-death-tuberculosis-in-19th-century-concord.

Marcus, A.C., Kaplan, C.P., Crane, L.A., et al. (1998). Reducing loss-to-follow-up among women with abnormal Pap smears. Results from a randomized trial testing an intensive follow-up protocol and economic incentives. *Medical Care*, 36(3), 397–410

Mays, S., & Taylor, G. M. (2003). A first prehistoric case of tuberculosis from Britain. *International Journal of Osteoarchaeology*, 13(4), 189-196. https://doi.org/10.1002/oa.671

Ministerul Sănătății din România (2015). *Ghid metodologic de implementare a programului național de prevenire, supraveghere și control al tuberculozei*, Monitorul Oficial nr. 748 bis din 7 octombrie 2015

Mishra, P., Hansen, E. H., Sabroe, S., & Kafle, K. K. (2005). Socio-economic status and adherence to tuberculosis treatment: a case-control study in a district of Nepal. *The International Journal of Tuberculosis and Lung Disease*, 9(10), 1134-1139

Mittal, C., & Gupta, S. C. (2011). Noncompliance to DOTS: How it can be decreased. Indian *Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*, 36(1), 27

Moldovan, I. (1926). *Combaterea tuberculozei*. Conferințele ținute la cursurile de perfecționare pentru medici, 1(8), p173-181, Institutul de Arte grafice „Viața", Cluj

Munro, S. A., Lewin, S. A., Smith, H. J., Engel, M. E., Fretheim, A., & Volmink, J. (2007). Patient adherence to tuberculosis treatment: A systematic review of qualitative research. *PLoS Medicine*, 4(7), e238. https://doi.org/10.1371/journal.pmed.0040238

Munteanu, R., Baciu, G., Bălan, A. (2016). Tuberculoza în aspect epidemiologic. *InfoMed*, 2016, 206-208

Ndishimye, P., Domokos, B., Stillo, J., Seghrouchni, F., Mrabet, O., Homorodean, D., Pop, C. M. & Sadak, A. (2017). A case control study of risk factors associated with pulmonary tuberculosis in Romania: experience at a clinical hospital of pneumology. *Clujul Medical*, 90(1), 54.

Nițu, F. M., Olteanu, M., Streba, C. T., Jimborean, G., Postolache, P., Man, M. A., Trofor, A. C., Nemeş, R.M., Dragonu, L., Olteanu, M. (2017). Tuberculosis and its particularities in Romania and worldwide. *Romanian Journal of Morphology and Embryology*, 58(2), 385-92

Orlandi, G. M., Pereira, É. G., Biagolini, R. E. M., França, F. O. D. S., & Bertolozzi, M. R. (2019). Social incentives for adherence to tuberculosis treatment. *Revista Brasileira de Enfermagem*, 72, 1182-1188

Oxlade O, Murray M. (2012). Tuberculosis and poverty: why are the poor at greater risk in India? *PLoS One*, 7, e47533

Palha, P. F., Silva, L. M. C. D., Wysocki, A. D., Andrade, R. L. D. P., Protti, S. T., Scatena, L. M., & Villa, T. C. S. (2012). Access to healthcare services for tuberculosis: analysis of patient satisfaction. *Revista da Escola de Enfermagem da USP*, 46, 342-348

Pârvulescu, I. (2005). *În intimitatea secolului 19*. Humanitas, Bucureşti

Pele, A., Pele S., Mihălțan, F.D. (Red). (2009). *Scurtă introspecție în trecutul pneumologiei româneşti*. Societatea Română de Pneumologie. Bucureşti

Pilote, L., Tulsky, J. P., Zolopa, A. R., Hahn, J. A., Schecter, G. F., & Moss, A. R. (1996). Tuberculosis prophylaxis in the homeless: a trial to improve adherence to referral. *Archives of Internal Medicine*, 156(2), 161-165

Plit, M. L., Anderson, R., Van Rensburg, C. E., Page-Shipp, L., Blott, J. A., Fresen, J. L., & Feldman, C. (1998). Influence of antimicrobial chemotherapy on spirometric parameters and pro-inflammatory indices in severe pulmonary tuberculosis. *European Respiratory Journal*, 12(2), 351-356

Prozorov, A. A., Zaichikova, M. V., & Danilenko, V. N. (2012). Mycobacterium tuberculosis mutants with multidrug resistance: History of origin, genetic and molecular mechanisms of resistance, and emerging challenges. *Russian Journal of Genetics*, 48(1), 1-14. https://doi.org/10.1134/s1022795411120118

Radu, M. (2012). Medicine and humanism. *Medical Connections*, 7 (1), 67-70

Rais, C., Tăerel, A. E., Ștefănescu, E., Brumarel, M., Safta, V., Adauji, S., Priscu, V. & Soroceanu, V. (2016). Epidemiological aspects of tuberculosis in adults in Romania versus the Republic of Moldova. *Farmácia*, 64(4), 643-650

Rizzo, J.A., Zeckhauser, R.J. (2003). Reference incomes, loss aversion, and physician behavior. *The Review of Economics and Statistics*, 85(4), 909–22

Roberts, C. A., & Buikstra, J. E. (2003). *The Bioarchaeology of Tuberculosis: A Global View on a Reemerging Disease*. Gainesville: University Press of Florida

Schluger, N., Ciotoli, C., Cohen, D., Johnson, H., & Rom, W. N. (1995). Comprehensive tuberculosis control for patients at high risk for noncompliance. *American Journal of Respiratory and Critical Care Medicine*, 151(5), 1486-1490

Soaeres, F.V., Perez Ribas, R., Osorio, R.G. (2007). *Evaluating the impact of Brazil's Bolsa Familia cash transfer programmes in comparative perspective*. Brasilia, Brazil: International Poverty Centre, Evaluation Notes, UNDP. http://www.ipcundp.org/pub/IPCEvaluationNote1.pdf

Sontag, S. (1977). *Illness as metaphor*. New York: Farrar, Straus, & Giroux

Star, S. L., & Bowker, G. C. (1997). Of lungs and Lungers: The classified story of tuberculosis. *Mind, Culture, and Activity*, 4(1), 3-23. https://doi.org/10.1207/s15327884mca0401_2

Stevens-Simon, C., O'Connor, P., Bassford, K. (1994). Incentives enhance postpartum compliance among adolescent prenatal patients. *Journal of Adolescence Health*, 15(5), 396–9

Stillo, J. J. (2017). *Sick Systems: How Drug-resistant Tuberculosis Became Practically Incurable in Romania*. City University of New York

Tan Tock Seng Hospital (2015). *SATA Common Health strengthens partnership with Tan Tock Seng Hospital (TTSH) with a new MOU*. https://www.ttsh.com.sg/aboutus/newsroom/press-releases/article.aspx?id=4679

Torrens, A. W., Rasella, D., Boccia, D., Maciel, E. L., Nery, J. S., Olson, Z. D., Barreira, D. C., & Sanchez, M. N. (2016). Effectiveness of a conditional cash transfer programme on TB cure rate: A retrospective cohort study in Brazil. *Transactions of The Royal Society of Tropical Medicine and Hygiene*, 110(3), 199-206. https://doi.org/10.1093/trstmh/trw011

Tversky, A., Kahneman, D.R. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics*, 106(4), 1039–61

UNDP (2014). *Cash Transfers and HIV prevention. Discussion paper: United Nations Development Programme*, New York, United States. http://www.undp.org/content/dam/undp/library/HIV-AIDS/HIV%20MDGs%20and%20Development%20Planning/UNDP%20Cash%20Transfers%20and%20HIV%20Prevention%20Web%20Final.pdf

van den Boogaard, J., Msoka, E., Homfray, M., Kibiki, G. S., Heldens, J. J. H. M., Felling, A. J. A., & Aarnoutse, R. E. (2012). An Exploration of Patient Perceptions of Adherence to Tuberculosis Treatment in Tanzania. *Qualitative Health Research*, 22(6), 835–845. https://doi.org/10.1177/1049732312438968

Volmink, J., & Garner, P. (2007). Directly observed therapy for treating tuberculosis. *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.cd003343.pub3

Wingfield, T., Boccia, D., Tovar, M. et al. (2014). Defining catastrophic costs and comparing their importance for adverse tuberculosis outcome with multi-drug resistance: a prospective cohort study, Peru. *PLoS Med*, 11, e1001675

World Health Organization. (2002). *An expanded DOTS framework for effective tuberculosis control*. Retrieved from http:// whqlibdoc.who.int/hq/2002/WHO_CDS_TB_2002.297.pdf

World Health Organization. (2008). *Anti-tuberculosis drug resistance in the world*. Report No. 4. Geneva: Author. Retrieved from http://www.who.int/tb/publications/2008/drs_report4_26feb08.pdf

World Health Organization (2019). *One-to-One Peer Support by and for People with Lived Experience: WHO Quality Rights Guidance Module*. Geneva, Switzerland

World Health Organization. (2022). *WHO consolidated guidelines on tuberculosis*. Geneva, Switzerland

Xu, W., Lu, W., Zhou, Y., Zhu, L., Shen, H., & Wang, J. (2009). Adherence to anti-tuberculosis treatment among pulmonary tuberculosis patients: a qualitative and quantitative study. *BMC Health Services Research*, 9, 1-8

Zeelenberg, M., Pieters, R. (2004). Consequences of regret aversion in real life: The case of the Dutch postcode lottery. *Organizational Behavior and Human Decision Processes*, 93(2), 155–68

Maria-Larisa Șoroagă is currently working within an NGO (Romanian Association for Health Promotion) and simultaneously pursuing a doctoral degree in Sociology at the University of Bucharest. She began her career as a social worker in a grant-funded project aimed at providing psycho-socio-medical support to patients diagnosed with tuberculosis. She continued her professional activity in the field of tuberculosis projects for a period of six years. Throughout this time, she participated in the implementation of several screening projects funded by European funds, as well as tuberculosis treatment projects. She worked closely with tuberculosis patients as a social worker, offering them support and counseling to increase treatment adherence and improve their quality of life.