

'Tobacco and alcohol use are playing critical role in the interaction of social determinants of non-communicable diseases in Nepal': a systems perspective

Sudesh Raj Sharma (✉ yoursudesh@gmail.com)

DIYASU Community Development Centre <https://orcid.org/0000-0002-7880-5517>

Anna Matheson

Victoria University of Wellington

Danielle Lambrick

University of Southampton

James Faulkner

University of Winchester

David W Lounsbury

Albert Einstein College of Medicine

Abhinav Vaidya

Kathmandu Medical College

Rachel Page

Massey University

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Abstract

Background: Tobacco and alcohol use are major behavioural risks in developing countries like Nepal contributing to rapid increase in non-communicable diseases (NCDs). This causal relationship is further complicated by the multi-level social determinants such as socio-political context, socio-economic factors and health system. Systems approach has potential to facilitate understanding of such complex causal mechanism. The objective of this paper was to describe the role of tobacco and alcohol use in the interaction of social determinants of NCDs in Nepal.

Method: The study was a qualitative study design guided by the Systemic Intervention methodology. The study involved key informant interviews (n=63) and focus group discussions (n=12) at different levels (policy, district and/or community) and was informed by the adapted Social Determinants of Health Framework . The data analysis involved case study based thematic analysis using framework approach and development of causal loop diagram. The study also involved three sense making sessions with key stakeholders.

Results: Five key interacting themes emerged during the data analysis. Habit and misconception relating to alcohol and tobacco use contributed to the use and addiction of tobacco and alcohol. Low focus on prevention by health system further contributed to the problem. Decline in community capital and gendered social constructs influenced tobacco and alcohol use. Socio-economic status of families/communities was discussed as a potential root cause of use and addiction of tobacco and alcohol. These interacting themes were utilized to develop iterative causal loop diagrams showing the influence of tobacco and alcohol use in the interaction of social determinants of NCDs in Nepal.

Conclusion: Tobacco and alcohol use and addiction causally linked broader social determinants (social, economic and political) to NCD in the context of Nepal. These CLDs showed how socio-economic circumstances was influencing addiction and availability of tobacco and alcohol products in Nepal. A multi-sectoral response led by health system is urgently needed.

Background

Tobacco and alcohol use are major behavioural risks contributing to rapid rise in non-communicable diseases (NCDs) in developing countries like Nepal [1–3]. The evidence from Nepal have consistently shown that tobacco consumption (31%) and alcohol use (17%) are high and linked to poverty, illiteracy, low skilled occupation [1, 4], and other recognized social and commercial determinants of health [5]. Nepal has strong tobacco and alcohol control policies, yet it continues to experience a high level of tobacco and alcohol use, especially by disadvantaged groups. Developed countries like Australia and New Zealand are leading in their efforts to control tobacco and alcohol among its disadvantaged groups by taking action on the social determinants of tobacco and alcohol use [6–9]. In particular, they are employing social determinants approach to address the issue of health inequity and substance abuse among their indigenous population who are historically disadvantaged and marginalized. However, these

countries have gradually aligned their policies and programmes towards reducing the current gaps in the health status between indigenous and non-indigenous groups through actions on social determinants of health. Nepal which has substantial issue of health inequity among its sub-population can reap the benefits by learning and adapting from the approach adopted by the developed countries.

Systems science approaches are increasingly applied to understand and tackle multi-level, complex problems in population health [10, 11]. A systems perspective on complex problems emphasizes an understanding of how outcomes are emergent and generated from the dynamic interaction of multiple internal parts, as well as the impact of external environment determinants on these internal parts. Experts argue for its potential application in public health as it provides basis for richer understanding, adaptation and continuous learning and reflection [12–14]. Systems methods and tools are well suited for illuminating the dynamic structure and emergent behaviour of complex health problems like tobacco and alcohol use. While systems science approaches have been increasingly utilized for understanding and modelling complex public health issues in developed countries generating compelling evidences for policy actions [11, 15–17], there are far fewer instances of their application in developing countries context [18, 19].

What is needed urgently is a way to foster critical, context-specific dialogue about the interdependent relationships among these social determinants, tobacco and alcohol use, and the unfolding burden of NCDs in Nepal. With improved understanding about the impact of social determinants on the health of the Nepalese utilizing systems thinking approach, effective public health policies and practices can be enacted and translated into action to reduce these behavioural risks [20]. The objective of this paper is to describe the role of tobacco and alcohol use in the interaction of social determinants of NCDs in Nepal from systems perspective.

Methods

The overall study design was qualitative (*Figure 1*) and informed by systemic intervention methodology (SI) [21]. SI adopts critical systems thinking and stresses use of multiple methods. Critical systems thinking has aims to address the asymmetric power relations among stakeholders in addressing complex issues such as NCDs which disproportionately affect disadvantaged groups. In this study, involvement of disadvantaged stakeholders and ensuring their meaningful participation helped illuminate the NCD problem from critical systems perspective.

Figure 1: Systemic Intervention design of the study of social determinants of NCDs in Nepal

A combination of two methods were applied: case study [22] and system dynamics [14]. These methods complement each other and critically informed the study design to address the research question. The case study method framed the scope of qualitative data collection and analyses to understand the generative mechanism of the NCDs problem. Subsequently, system dynamics was used to design causal loop diagrams (CLDs), which depicted the causal linkages identified through case study analysis and simultaneously improved the case study analysis by providing additional insights on causal mechanism.

Case study

Study area and participants: Two case districts were purposively selected from two district geographical region of Nepal i.e. Morang district from Terai (plain) region and Bhaktapur district from Hill region. The case study involved key informant interviews with district and village level stakeholders and focus groups (FGs) with community people. The district and Village Development Committees (VDCs) /municipality level key informants were identified through consultation with District Public Health Offices and included participants from District Health Office, Local Development Office, local non-government organizations (NGOs), Primary Health Centres, health posts, local schools and Village Development Office. One municipality and two VDCs from each case districts were selected for interviewing key local stakeholders i.e. Madhyapur Thimi Municipality, Dadhikot VDC and Sipadol VDC from Bhaktapur district and Biratnagar Municipality, Tankisinwari VDC and Bahuni VDC from Morang.

The District Public Health Offices helped to identify two communities (one advantaged and other disadvantaged communities) within each VDC/Municipality for focus groups (FGs). Local health workers and Female Community Health Volunteers supported the primary researcher in the planning and conducting focus groups in the target communities.

Policy level key informant interviews were conducted to supplement the case studies and comprised of multi-sector participants involved in formulating of the *Multi-sectoral Action Plan for the Prevention and Control of NCDs 2015–2020* and participants from NGOs and academia. The participants recruited for key informant interview varied in terms of work place, years of experience, sectors (health as well as non-health) and expertise (implementation as well as policy level). The study adopted a “maximum variation” sampling strategy to collect perspectives relating to NCD issues from across the sectors [23].

Study tools: The study tools (Interview schedule and focus group guideline) were developed following the study framework adapted from the social determinants of health framework of the World Health Organization (*Figure 2*). The study tools were extensively discussed in light of the adapted framework by the research team. The tools were first developed in English and translated into Nepali. The research team took the opportunity to rearrange the questions in the schedule based on the experience of first few interviews to improve the quality of interviews and FG.

Figure 2: Study framework adapted from the *Social Determinants of Health Framework* of World Health Organization

Data collection: The data collection was conducted for four months (July-October, 2016) based in Nepal. The first author interviewed 39 key informants from the two case districts and 24 key informants from policy level. The time of interview ranged from 30 minutes to one hour. The first author simultaneously started the district and community level data collection at Bhaktapur district and at policy level. The data collection in Morang district started after the completion of the majority of the interviews and FGDs at Bhaktapur and policy level. Some interviews with policy level stakeholders were completed towards the end of data collection period due to scheduling issues.

The first author conducted 12 focus groups in six selected VDCs/municipalities from the two cases districts involving five to 10 community people affected by and/or caring for family members with NCDs metabolic risks. In each VDC/municipality, the first author conducted two FGs where one group represented disadvantaged communities and the other advantaged/mixed communities. The FGs were facilitated with the help of local Female Community Health Volunteers. The time of an FG ranged from 45 minutes to one hour.

The audio-recordings of interviews and FGs were first transcribed in Nepali and then translated into English for coding and thematic analysis. The translation was carried out by two public health graduates from Nepal and were regularly supervised by the first author. Open descriptive coding guided by the study framework was done by the first author in Dedoose, a web-based data management platform [24]. The first author coded few interviews first and compared the transcripts for consistency and clarity in coding. The final codes were then grouped and charted in Ms Excel sheet based on the study framework and major themes and causal linkages were interpreted and iterated. The research team utilized the framework approach to code the themes and carry out the thematic analysis guided by the study framework (*Figure 2*) [25].

Causal Loop Diagramming

The causal linkages and mechanisms identified through case study were depicted in the form of CLDs, a qualitative approach used in system dynamics modelling to identify feedback structures that illustrate causal influences for a given problem of interest. A CLD depicts a systems problem by showing causal variables interconnected with arrows denoting causal influence (mechanism) among variables. The convention/analytical strategy to develop the CLD in this research has been adapted mainly from a key system dynamics resources namely *Business Dynamics* [14]. CLDs comprise two kinds of loops: balancing and reinforcing. The balancing loop is a goal seeking loop which is indicated by “B” within CLD and indicates stabilizing feature of the loop. Generally, loops consisting of health intervention variables (health education campaign, screening, treatment, etc.) that tries to bring down the magnitude of health problems are examples of balancing loops. Reinforcing loop (indicated by “R” within CLD) involves action that produces a result which triggers similar actions resulting in growth or decline, for example the vicious cycle of poverty and illness These loops are further explained in the results section in the context of this study. The CLD was built using the “Vensim” software [26].

Stakeholder Validation

Stakeholder validation was conducted through organizing three workshops, two at respective case districts and one at national level during January/February, 2018. The workshops helped to further enrich the analysis through the feedback and suggestions from the stakeholders. These workshops, indeed, became opportunities to sensitise the stakeholders about the tobacco and alcohol issues in Nepal. The

research team believes these workshops proved useful to reach the purpose of this research and the methodological stance of SI methodology.

Ethical consideration

Formal ethical approvals were obtained from the Massey University Human Ethics Committee (SOA 16/37) and Nepal Health Research Council Ethics Committee (Reg. no. 163/2016) respectively. Clear explanation about the purpose of the study and voluntary participation, using simple to understand information sheet, was provided to all participants, and in particular disadvantaged groups. A prior informed and written consent was also obtained from all participants for semi-structured interview and focus group discussion.

Results

Five key interrelated thematic areas relating to tobacco and alcohol use emerged from the data analysis, which were utilized to develop a collection of CLDs to elucidate feedback structures of interest. These interrelated themes described a range of social determinants operating at different levels (family, community and societal levels) including addiction and misconception of tobacco and alcohol products, declining community capital, health systems issues, gendered constructs and socio-economic status.

Theme 1: Addiction and misconception related to alcohol and tobacco use contributing to increased risk

Awareness of the impacts on health of tobacco and alcohol use was widely present among general population both in rural and urban areas according to key informants and FG participants. However, despite having knowledge about risks of smoking and drinking, people continued to indulge in these risk behaviours most likely due to addiction. A FG participant from rural Bhaktapur explained:

“It is actually the addiction that plays a role here [for smoking and drinking habit]. If you do not smoke for some time, then you feel like something’s missing, that’s it. It is similar to the condition where a drug addict acts like a crazy [person] if he doesn’t get some.” (ID: 76)

Participants reported that adults from the study areas were exposed and addicted to such products often at a younger age. Some key informants shared a perception that the problem was getting worse in younger age groups with younger groups widely using the tobacco and alcohol products. Young people could access any liquor shops and tobacco shops to buy alcohol and tobacco products, with no questions asked. A health worker from urban Bhaktapur stated:

“8–9 class students smoke tobacco who can get them easily from the shops.” (ID: 42)

Young people would start smoking and drinking alcohol often due to peer-pressure and imitating the behaviour of an adult and, gradually become addicted to its use. When something addictive is easily available; such environment encourages young people to experiment leading to addictive habits. A key informant from rural Morang shared:

“And then, we have alcoholism and smoking growing trend especially among students and young people. There is peer pressure to drink and smoke. These students hide and smoke.” (ID: 54)

Participants reflected that addiction was linked to families and communities facing interrelated stresses relating to economic hardship, unemployment and family violence and often driven by misconceptions. Participants shared many misconceptions relating to tobacco and alcohol use. A very common misconception was that tobacco and alcohol relaxed and reduced physical and mental stress which was viewed as influencing uptake and use of tobacco and alcohol. A health worker from rural Bhaktapur explained:

“Increasing stress due to unemployment and lot of leisure time expose people to bad habits at early age.” (ID: 35)

A FG participant candidly shared:

“Not only smoking alleviates tiredness, if one smokes, then one gets some rest from work.” (ID: 74)

Theme 2: Low focus on prevention by health system contributing to tobacco and alcohol use and NCDs

Overall, there has been limited focus on system strengthening and preventative approaches for NCDs prevention. A curative orientation was dominant at both policy and implementation level limiting preventative actions against NCDs. Resources gained from tobacco and alcohol taxes were often utilized for curative and other non-health budgetary purposes and not for preventing tobacco and alcohol use and addiction.

“Finance Ministry do not provide enough resources (for prevention) despite huge amount is generated from health tax.” (ID: 14; Policy level key informant)

Weak monitoring and enforcement was leading to unabated demand, production, marketing and availability of such products leading to increased use and addiction of tobacco and alcohol.

“There is one investigation committee [at District Level] but it is not much active” (ID: 26; District level key informant; Bhaktapur)

Both policy and district level participants also expressed that district health system and below did not have any well-resourced programs for preventing tobacco and alcohol use as well as providing

counselling support for those already addicted to tobacco and alcohol.

“These tobacco, tobacco products and drugs become addiction to people. We apply the prevention approach to those who don’t consume these substances. For those who consume these substances, rehabilitation and counselling must be strengthened.” (ID: 50; District level key informant; Morang)

This lack of a focused policy structure and leadership for initiating NCD prevention actions was expressed by many policy level key informants. A policy stakeholder shared:

“Curative Service Division is leading this fight against NCD but more from curative perspective and less from Health promotion.” (ID: 15)

Further, another policy stakeholder emphasized on effective utilization of scattered resources for NCD prevention through structural reform at policy level.

“There are budget for NCD prevention but are scattered in various places. That has to be managed through certain centre in an effective way.” (ID: 12)

Theme 3: Declining community capital/cohesion influencing tobacco and alcohol availability and use

Key informants and FG participants suggested that community capital and cohesion was on decline and often linked stressful economic circumstance of families and individuals with declining community capital/cohesion in the communities. A FCVH from rural Bhaktapur shared:

“Community [is] not as cohesive and helpful as previously.” (ID: 33)

One FG participant from rural Morang shared that families and communities were not supporting each other enough when advice was given that children and young people should not indulge in addictive behaviour.

“If somebody’s son is seen smoking or drinking and other person tries to stop him saying why he is smoking, then his guardian will come and say- why do you care about my son? He eats whatever he wants.” (ID: 67)

Some actions were initiated by communities especially women’s group to reduce alcohol abuse but they were often short lived due to the lack of support from male members and community leaders.

“We have tried to address this many times. But whenever women raise their voice against these, pub and shop owner quarrel with them. Police was sought for help but they didn’t take any action.” (ID: 56; Village level key informant; Rural Bhaktapur)

Alcohol and tobacco were not considered a significant problem at community level by local authorities. This was illustrated when one of the district level key informant from Morang shared that alcohol and tobacco related issues never entered into the local planning agenda.

“Due to this, during planning process from the community level (planning must start from the community level) the issues regarding the prohibition of alcohol and tobacco products etc. aren’t arisen while discussing about the plans.” (ID: 50)

Further, there has been very low interest from community based social organizations to tackle alcohol and tobacco issues due to their widely pervasive nature within Nepalese society and possibly due to limited funding. A district level key informant from Morang shared:

“In my 10 years career, till now only one organization had been here with motto to control tobacco and alcohol.” (ID: 50)

On the supply side, local shop owners who often belong to same communities would take up the alcohol business (as supplier or seller) due to their own circumstances of hardship. A FG participant from rural Morang shared:

“They (shopkeepers) say they won’t make money if they do not sell alcohol”. (ID: 68)

Some key informants did share that despite alternatives to their business, the local shop owners were putting economic benefits before social and health benefits and selling widely even to underage groups. A social worker from urban Bhaktapur shared:

“And why would business people think before selling; those college students are the source of profit. Profit margin is high in alcohol and cigarettes. Ethics and values are neglected by such business owners.” (ID: 44)

Local key informants also shared that home-made alcohol producers used hazardous methods to amplify alcohol strength which would serve as a means to attracting more customers. Some producers were mixing chemicals and toxic substances that are hazardous and playing with public health for economic gains.

“What I have heard is that they use inedible substances including animal remains. They try to make strong alcohol using urea fertilizer. That can severely affect our health.” (ID: 76; FG participant; Rural Bhaktapur)

Theme 4: Gendered social constructs and power differences influencing tobacco and alcohol use

Tobacco and alcohol use were reportedly implicitly driven by gendered social constructs and power differences. Study participants shared that it was mainly males within their communities that demonstrated addictive behaviours.

“And, mostly the household head, male members are addicted to such alcohol and tobacco.” (ID: 39; Village level key informant; Bhaktapur)

Local level key informants further indicated that this situation of widespread addiction among male members could be linked to combination of factors including relieving stresses, financial autonomy of male members and low social status of female. Male had more autonomy and control of finances and consumed tobacco and alcohol products at their will in the context of the case districts.

“Male are more intensely involved in alcoholism. They earn money during day time and spend it on drinks at night. This problem is more intense among 6–7 household in our locality. Even domestic violence is common in those houses.” (ID: 56; Village level key informant; Morang; Health)

A female FG participant from rural Morang was vocal about the increased stress on women due to the drinking habit of male members and their inability to do anything to address it.

“You males drink, smoke and this problem [hypertension and diabetes] is because we take stress about that.” (ID: 67; Female FG Participant; Rural Morang)

This power imbalance can be linked to the prevalent gender discrimination and disempowerment of women engrained in Nepalese socio-cultural practices. Participants reported that the gender discrimination was still prevalent in hidden form in all sections of society.

“There is still discrimination but in a hidden way but it is quite less than what was in the past.” (ID: 41; Municipal level key informant; Bhaktapur)

Interestingly, some key informants noted an increasing trend in the tobacco use and alcohol consumption among females. A policy level key informant further stressed that national data may be underestimating the number of female smokers but in reality, there has been a rapid increase in the number of female smokers.

“We can clearly observe significant number of women involved in smoking and tobacco consumption especially in rural areas. But our national data have shown less prevalence in females.” (ID: 5)

The policy informant further added that the underestimation of female tobacco users may be due to our socio-cultural expectation of the behaviour of the female which is rooted in the patriarchal social construct.

“There is the perception in our society that females shouldn't be consuming such substances and so females do not give true answers and also our enumerators may not have been able to explore effectively.” (ID: 5)>

Theme 5: Socio-economic status as the root driver of tobacco and alcohol use

The socio economic-status was reported to have the cross-cutting linkage with tobacco and alcohol use in the case study districts. Key informants shared that alcohol and tobacco consumption was a major community problem especially among low income group.

“It is also a major problem. Since maximum people works in factories, they use tobacco and alcohol.” (ID: 61; Village level key informant; Morang)

Key informants shared some key reasons for the addiction of alcohol and tobacco products among lower income groups which, in turn, affected their financial status. A district level stakeholder shared:

“In disadvantaged community where there is poverty; people do labour work and smoke cigarette during break, and that is actually their resting time.” (ID: 26)

Further, alcohol and tobacco were often seen as a way to ward off stress and tiredness especially by low income group.

“Most of the people here are engaged in labour work. They have to do hard work like carrying stones and get tired and do not even eat their food on time. In the evening to get rid of their tiredness, they consume alcohol.” (ID: 37; Village level key informant; Bhaktapur)

Study participants shared that there were many shops selling alcohol and tobacco in major junctions and shops and most of them were from low-income group. These low income community members started the local business of selling alcohol and tobacco products due to lack of job opportunities and high profit margins from tobacco and alcohol products.

“However, these home-made alcohols are the means to earn money for the small shops and poorer households.” (ID: 55; Village level key informant; Morang)

Interestingly, there was blurring of the boundaries between traditional drinkers (Gurung, Rai, Magar, Newar and similar ethnicities who are culturally allowed to drink alcohol) collectively referred as *Matwali* and traditional non-drinkers (Brahmin, Chhetri and similar ethnicities who are culturally forbidden to drink alcohol) collectively referred as *Tangadhari* leading to increased alcohol consumption in Nepalese society. Participants reported that drinking among traditional non-drinkers has significantly increased due to modernization and the socio-cultural changes.

“There was social rule that it is something to be consumed by Matwali but not by Brahmins and Chhetris but now the situation has just reversed..... These days it is hard to find Brahmin/ Chhetris who do not drink.” (ID: 47; District level key informant; Morang)

Alcohol is very much ingrained in the cultural practice of the *Matwali* ethnic group that they require alcohol for their each and every cultural practice for birth, marriage or death. Due to the socio-economic circumstances of socially disadvantaged *Matwali* communities, many houses in such *Matwali* communities were involved in home-brewing and would supply the alcohol to a number of shops around the locality and nearby cities.

“Every morning people sell more than 100 litres of alcoholic drink. The (specific ethnicity) people brew whole night and sell to every shops without the fear of police.” (ID: 36; Village level key informant; Bhaktapur)

Matwali were using their traditional skill for home-brewing at commercial scale in order to improve their socio-economic conditions. One of the policy stakeholders explained the situation as follows:

“Matwali have cultural practice of brewing homemade alcohol and we do not infringe into that cultural practices. But, many have been exploiting this cultural aspect for economic benefits including those who were non-traditional brewers.” (ID: 16)

CLD of major sub-systems depicting the interaction of tobacco and alcohol use, other social determinants and NCDs

In an effort to present the themes from dynamic systems perspective and gain insights on the interactions of the social determinants indicated by the themes, the research team developed CLDs to illustrate those dynamic interactions, or feedback structures, giving rise to the problem of NCDs in Nepal. The CLDs constitute three prominent feedback mechanisms or sub-systems displayed by sets of balancing and reinforcing loops that are possibly escalating the NCD epidemic in the case districts: [list the sub-systems here]

Prevention delay sub-system. The prevention delay subsystem comprises of balancing loops (indicated by B at the centre of the loop) which indicates goal seeking or stabilizing nature of the loop (Figure 3). The negative sign between “Government health system action” and “demand and supply” here means while increasing implementation of regulations and monitoring can decrease availability but the action is delayed (indicated by delay sign in the arrow i.e. //) resulting in increasing exposure of healthy population to tobacco and alcohol products leading to metabolic risks and NCDs (links have positive sign). This loop is balancing loop as the loop has a goal i.e. to reduce the supply and demand of tobacco and alcohol products but is suffering significant health systems action delays. Themes indicated that health system is failing to take any concrete actions against tobacco and alcohol problem both at community and policy level.

Figure 3: Causal loop diagram showing Prevention delay sub-system and its interaction with socio-economic and demand-supply sub-systems

In one of the primary prevention balancing loop, the positive linkage (+ sign in the arrowhead) between “Demand and supply of tobacco and alcohol products” and “Healthy population exposed to NCDs behavioural risks” indicates that the increase in tobacco and alcohol use is contributing to increase in metabolic risks and subsequently NCDs. The increasing health effects in-turn provide pressure to the authorities to initiate health system action. Here also, positive sign between “Population living with NCDs” and “Health system actions” means increase in health effects has increased health system actions but more on curative care and less on prevention.

Addiction driven demand-supply sub-system. This sub-system mainly constituted reinforcing loops showing how tobacco and alcohol use was leading to addiction and demand of such products in the case district of Nepal (Figure 4). As discussed earlier, the companies that produce tobacco and alcohol make profits from the sales of such addictive products and hence it can be argued that they have financial capital for marketing and policy influences. Such influences can be linked to increased supply and availability exposing and pushing people into adopting risk behaviour in the case districts.

Figure 4: Causal loop diagram showing Demand-supply sub-system and its interaction with prevention-delay and socio-economic sub-systems

A key reinforcing profit and influence loop can be seen in the middle of the above CLD, which indicates that the tobacco and alcohol companies utilize their economic power to influence policy which is a macro-economic issue (hence negative sign). This is creating a favourable situation for the business and growth of such companies. As a result, tobacco and alcohol products are widely available and sold as a result of increasing demand of such addictive products. Companies are able to maintain profit (positive sign) to continue funding their policy influence. Reinforcing loop (indicated by “R” within CLD) thus involves action that produces a result which influences more of the same action thus resulting in either growth or decline.

Socio-economic influence sub-system. This sub-system contained reinforcing loops which emphasized the social and economic influences contributing to the facilitation of a tobacco and alcohol conducive environment (Figure 5).

Figure 5: Causal loop diagram of Socio-economic influence sub-system and its interaction with prevention-delay and demand-supply sub-systems

Socio-economic hardship leading to experience of stress and family violence was linked with development of tobacco and alcohol addiction. Further, socio-economic situation in rural areas was resulting in youth migration to urban areas and foreign countries but was affecting the rural agriculture as well as the national economy. The effect in national economy can be linked to limited resources available for health and social sector.

Discussion

The themes and three key interlinked mechanisms or sub-systems illustrated the dynamics of interaction of social determinants of NCDs mediated by tobacco and alcohol use in Nepal. This section presents discussion around the themes and insights from the causal loop models using system archetypes.

Use and addiction of tobacco and alcohol products

In this study, the themes indicated that tobacco use and harmful alcohol consumption was common particularly among disadvantaged groups. The CLDs representing all three sub-systems showed how social and commercial determinants of health are contributing to increased use and addiction of such products in Nepal. Wide use of tobacco products in various forms was reported in each of the case district. Chewing of dried tobacco leaves was more popular in Terai compared to Hilly district where smoking was preferred. Such distinct practices based on geographical location have been observed in the national level surveys conducted in Nepal [27, 28]. Tobacco and alcohol products have non-lethal addictive properties leading to the addiction of such products [29, 30]. Studies have shown association among peer pressure, self-interest, stress, availability, administrative actions and use of tobacco and alcohol across different contexts in Nepal, India and South Africa [31–37].

The participants in this study repeatedly reported that smoking/drinking helped them relieve the feelings of stress. This reasoning has been noted in both developed and developing countries especially among disadvantaged groups [38–41]. However, evidence has indicated that in fact smoking increased stress as a result of cravings [42, 43]. Limited knowledge, misconception and complacency were key factors in the communal understanding that alcohol and smoking/tobacco reduces stress of an individual, a belief firmly held especially among poor and vulnerable groups subsequently leading to addiction.

As shown in this study, the addiction of tobacco and alcohol products was more prominent among the low income group who would often spend significant amounts of money on tobacco and alcohol products. Further, smoking and alcoholism was socially and culturally acceptable in many Nepalese societies despite their addictive nature. [44, 45]. Both local and international evidence has strongly linked tobacco and alcohol use as key risk factors of NCDs and metabolic risks [1, 2, 46].

Successful marketing and influence of big companies

As indicated in the themes and depicted in the CLDs, tobacco and alcohol companies have been very successful in marketing and sales of their products resulting in increased revenue and financial ability to undermine public health policies and actions. In particular, tobacco companies target young people from developing countries [47, 48]. Targeting youths have two benefits, they can be easily influenced and once they start using, they use the products for longer duration as they are still young. Further, developing countries regulations are not as strict as developed countries where policies and regulations around marketing and sales of such products have become very difficult. In particular, tobacco and alcohol industries argue that they contribute significantly to national income in many developing countries. As a

result of this, it is difficult for developing countries to take any concrete steps against tobacco companies [48]. However, anti-tobacco advocates counter argue that tobacco companies are mis-guiding government and in fact do not significantly contribute constructively to the national economy [49].

Health system challenges for prevention of tobacco and alcohol use

Addressing tobacco and alcohol addiction requires both health promotion actions as well as counselling and motivational support to the users to quit smoking and alcohol. This study indicated that these program were not focused and extremely limited. While developed countries allocate significant resources for those wanting to quit addictive behaviour [50, 51], developing countries like India, Vietnam and China have limited concrete mechanism in place [52–55].

Despite Nepal being among those countries with comprehensive tobacco and alcohol control laws and policies, the themes and CLDs showed that poor regulation and enforcement was resulting in wider availability of tobacco and alcohol products. Similar findings have been noted in countries where the laws are poorly implemented [56–58]. In contrast, those countries (often developed countries), where tobacco laws are strictly implemented, tobacco use has dramatically reduced [59]. Tobacco and alcohol influences have been widely noted across the globe and particularly in developing countries where the system mechanism are weak and can be influenced [20, 60]. Inefficiency, poor governance and lack of leadership within health and social system has been often cited as main system issues in developing countries for addressing complex problems like tobacco and alcohol use [61–63]. Developed countries have started to align their health and social system sector for addressing such complex problems [64, 65]. However, developing countries are still struggling to orient their health and social system for addressing social and commercial determinants of health leading to continued marginalization and social exclusion of already excluded groups.

Gender power gap for disproportionate smoking and drinking among male

In this study, gender and socio-cultural factors were also found to be linked with tobacco and alcohol use at family and community level. South Asian countries are patriarchal societies; with male enjoying more power and autonomy compared to female and hence indulging in risk behaviour. Evidence showed males were overwhelmingly engaged in addictive behaviour compared to females [4, 66, 67].

Further, impacts of such addictive behaviours on female and children were also highlighted by the themes. In Cambodia, women and children were impacted by addictive behaviour in terms of violence and socio-economic stress including health effects [68]. Similar effects of violence and stress being faced by women and families due to alcohol use by the men in families particularly in low socio-

economic groups has also been seen in India and Bangladesh [69–72]. A study in China indicated that women accepted the addictive behaviour of their husbands to maintain family harmony linking with the sub-ordinate and low status of women within the family [73]. Another study also found that women experiencing violence take up addictive behaviours [74].

However, there may be underestimation of the female users of tobacco and alcohol products in Nepal as indicated in the current study. A paper by Mackay argued that female tobacco and alcohol users could be rising in developing countries due to gender empowerment, loosening of socio-economic constraints and targeted campaign by companies [75]. Thus, the actual prevalence of tobacco and alcohol consumption among female population could be more in Nepal and only known through ensuring researchers being conducted in a socio-culturally appropriate way.

Social capital influencing tobacco availability and use

This study indicated that Nepalese society was increasingly becoming accustomed to an environment conducive to universal availability and use of tobacco and alcohol. Further, the favourable environment for tobacco and alcohol addiction including their wide availability at local level indicated towards decrease in social capital and cohesion within communities. In this study, small businesses within communities sold tobacco and alcohol widely without considering their impact on public health. Further, there were limited community action against rise of tobacco and alcohol businesses within communities. Increasingly, studies have shown causal linkage between community capital and cohesion and health outcomes [76, 77].

Poverty as root cause of use/addiction among disadvantaged groups

The themes and the CLD (sub-system three) has indicated that socio-economic circumstances of families has been the root driver of tobacco and alcohol use and inversely, tobacco and alcohol use has led to income loss and economic challenges for families. Addiction often leads to huge economic losses [78, 79] and pushes individuals into a vicious poverty cycle(45). Similar to the findings of this study, studies have shown that children and youths from such disadvantaged communities were often exposed to alcohol use at very early age [45, 80]. Often, these children gradually drop out of school and hence join the cohort of non-skilled workforce with an addictive behaviour and poor health. A longitudinal study suggested similar economic and health impact of alcohol on adults who were exposed to alcohol at an early age [81]. The point here is that disadvantaged communities faced severe social and economic challenges to pull themselves out from the vicious trap of poverty and addiction.

While there was supposedly a high prevalence of home-made alcohol abuse in the traditional drinking ethnic group (*Matwali*), there appeared to be rapid increase in alcohol consumption in the traditional non-drinking ethnic group (*Tangadhari*). This shift has been noted in research carried out almost two decades

ago in Nepal [45]. This indicated that use and addiction of tobacco and alcohol products were mainly linked with socio-economic circumstances. Further, communities in Terai (Morang district is a Terai district) were more economically deprived compared to communities in hills (Bhaktapur is a hilly district) making communities in Terai more vulnerable to effects of tobacco and alcohol.

Illicit trading of tobacco and alcohol products were rife in both case districts. In line with our findings that disadvantaged groups were engaged in sales of alcohol and tobacco products, a review indicated that most of the small tobacco and alcohol businesses were often operated by low income groups and opt to sale such products due to high demand and for livelihood reasons [27]. WHO have reported that often disadvantaged families within communities sell tobacco and alcohol products in order to improve their socio-economic circumstances [82]. In this study, *Matwali* ethnicities have been utilizing their traditional skills to produce and sell alcohol to overcome their financial situations in both case districts. These groups have been historically marginalized and often have poor socio-economic circumstances [83]. Any action against such sales by disadvantaged group raised both ethical and economic questions such as: can authorities take away the only means of their livelihood; are authorities able to provide any alternative to their business?

System archetypes and proposed applications of resultant CLDs

System archetypes are templates or simple version of CLDs for understanding common problems or dilemmas in organization or system and in a way generates insights for action among stakeholders. The sub-systems and archetypes (Figure 6) informed by the current case study is a starting point for critical dialogue and action in Nepal, to understand and address the complex issue of reducing behavioural risks and in mitigating the burden of NCDs.

Figure 6: System archetype applied to prevention and treatment of NCDs

The prevention delay sub-system resonates with “Fixes that fail” systems archetypes [84] (Figure 6 A). The health system of Nepal is based on primary health care approach with foundation being primary prevention of health problems. However, more resources is allocated towards treatment of NCDs as a result of which prevention is receiving limited resources. The “Treatment” fix is driven to key reasons: urgent need of resources to support the increasing number of people being impacted by NCDs (such as cancer, chronic kidney disease and cardio-vascular diseases) and preference of treatment over prevention by the policy makers due to invisibility and time-lag nature of the effects of prevention. Over an extended time horizon, the “treatment” fix is only going to increase the prevalence of NCDs as is currently happening in Nepal.

“Drifting goal” archetype (Figure 6 B) can explain a key phenomenon indicated by sub-system 2 (Demand-supply) whereby policy makers are not able to raise excise tax on tobacco products as per international standard due to the influence of tobacco and alcohol companies. While the prevention experts have been pushing for increasing excise tax recommended by WHO, they have limited resources and power leading to delay in implementation of comprehensive prevention measures.

“Shifting the burden” archetype (Figure 6 C) provides a key insight from within the socio-economic sub-system. The archetype depicts the inability of health system to see the bigger picture or broader influences driving the NCDs problem. Health system has been focusing on narrow sets of interventions driven by foreign support and ignoring the complexity of the issue which is embedded in the socio-cultural context and demand local solution. What is needed is a local context based multi-sectoral actions targeting the social determinants of health.

In summary, the balancing effects of health system to prevent NCDs has already been significantly delayed leading to accumulation of burden of NCDs and hence, accelerated action is needed from the health system to have any significant impact. Some key insights from the model and archetypes include the prioritization of preventative action over curative actions and considering the social and commercial dimensions that is driving the addiction and use of tobacco and alcohol.

Study Limitations. There were some key limitations of the study. The study design and tools were guided by WHO’s Social determinants framework and hence may inherited the limitations of the SDH framework including being broad and wider in scope. Some of the determinants that could not be sufficiently supported by the data included: financial burden and their implications on the families affected by tobacco and alcohol as well as lived experience of the people with tobacco and alcohol addiction and NCDs. The study was also limited by the cross-sectional study design of the study. More studies focused on lived experience and focusing on few key determinants may help to further illuminate the effects of tobacco and alcohol use and their role in accelerating NCDs epidemic. There were some methodological limitations as well. The participants of the workshops were mainly from the health sector. This may have weakened the feedback process where we expected feedback from multi-sector participants. However, this approach does presents opportunity to further engage key stakeholders in transforming insights from current CLDs into collective action and learning [85].

Conclusions

Tobacco and alcohol use and addiction was a key mediating factor linking broader social determinants (social, economic and political) to NCDs in Nepal also depicted by the causal loop diagram. The research findings could be utilized in two ways: to broaden ones understanding of the role of tobacco and alcohol use in the interaction of the social determinants of health and, to identify systemic actions for addressing such complex challenges from systems perspective in Nepal and similar developing countries. This paper has not only shed light on addiction relating to use of alcohol and tobacco products, but how addiction and availability was influenced by socio-economic circumstances. Decline in community capital has been

linked to both demand and supply of such products at community level making it hard for any community based initiatives to control such products. From a gender perspective, tobacco and alcohol use were more concentrated among males whilst females were experiencing stress and violence due to addiction of such products among male member of a family. Socio-economic circumstances of families/communities not only pushed people into the habit of tobacco and alcohol use but for some, selling tobacco and alcohol products was a means to improve socio-economic conditions. This reinforcing pattern was identified as a potential root cause of use of tobacco and alcohol. Health and social systems in Nepal were failing to tackle NCDs from social determinants of health perspective including tackling tobacco and alcohol availability through policy and regulatory measures.

This paper has also indicated some potentially effective health system actions. These actions include prioritizing primordial and primary prevention of NCDs including increasing tax on tobacco and alcohol products and strengthening monitoring of sales of such products as envisaged in the WHO Framework Convention on Tobacco Control and Tobacco Control Act and Alcohol Control Act of Nepal. Ministry of Health, through a powerful central agency, could play a proactive role in informing and advocating all sectors including political leaders for integrating health as a cross-cutting agenda and impacting on social and commercial determinants of NCDs.

Abbreviations

CLD: Causal Loop Diagram; FG: Focused Group; NCDs: Non-communicable diseases; SDH: Social determinants of health; STEPS: Stepwise-approach to surveillance; VDC: Village Development Committee; WHO: World Health Organization

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Massey University Human Ethics Committee (SOA 16/37) and Nepal Health Research Council Ethics Committee (Reg. no. 163/2016) respectively. The participants were clearly explained about the purpose and voluntary nature of the study as well as about the research team using a simple information sheet. Written consents were obtained from all participants involved in the study.

Consent for publication

All the authors have consent for submission and publication.

Availability of data and material

Transcripts (without any personal identifier) and study tools are available on request (Email: yoursudesh@gmail.com; r.a.page@massey.ac.nz). This paper is part of the PhD study of the first author and after completion of the PhD study, all transcripts will be available through an open access data repository.

Competing interests

We declare no conflict of interest.

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Authors' contributions

SRS conceived and drafted the initial manuscript. AM, JF, DL, DWL, AV and RP all critically reviewed and revised the initial manuscript. SRS prepared the final manuscript. All authors read and approved the final manuscript.

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Figures

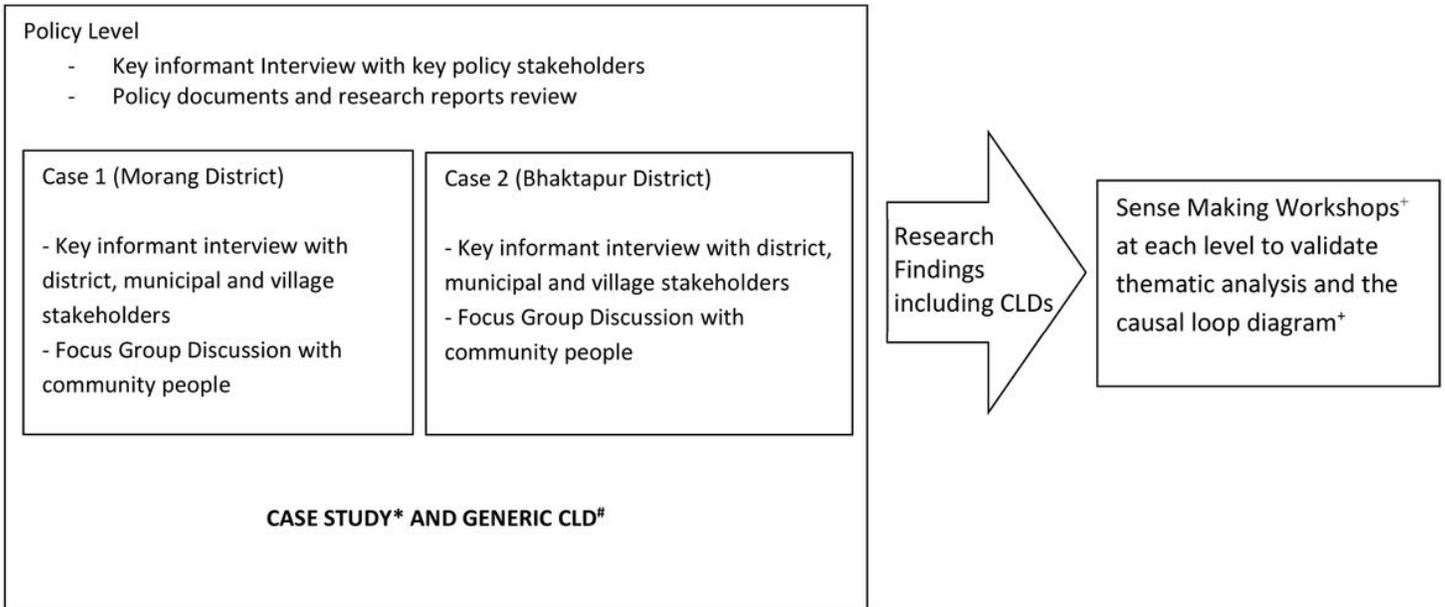


Figure 1

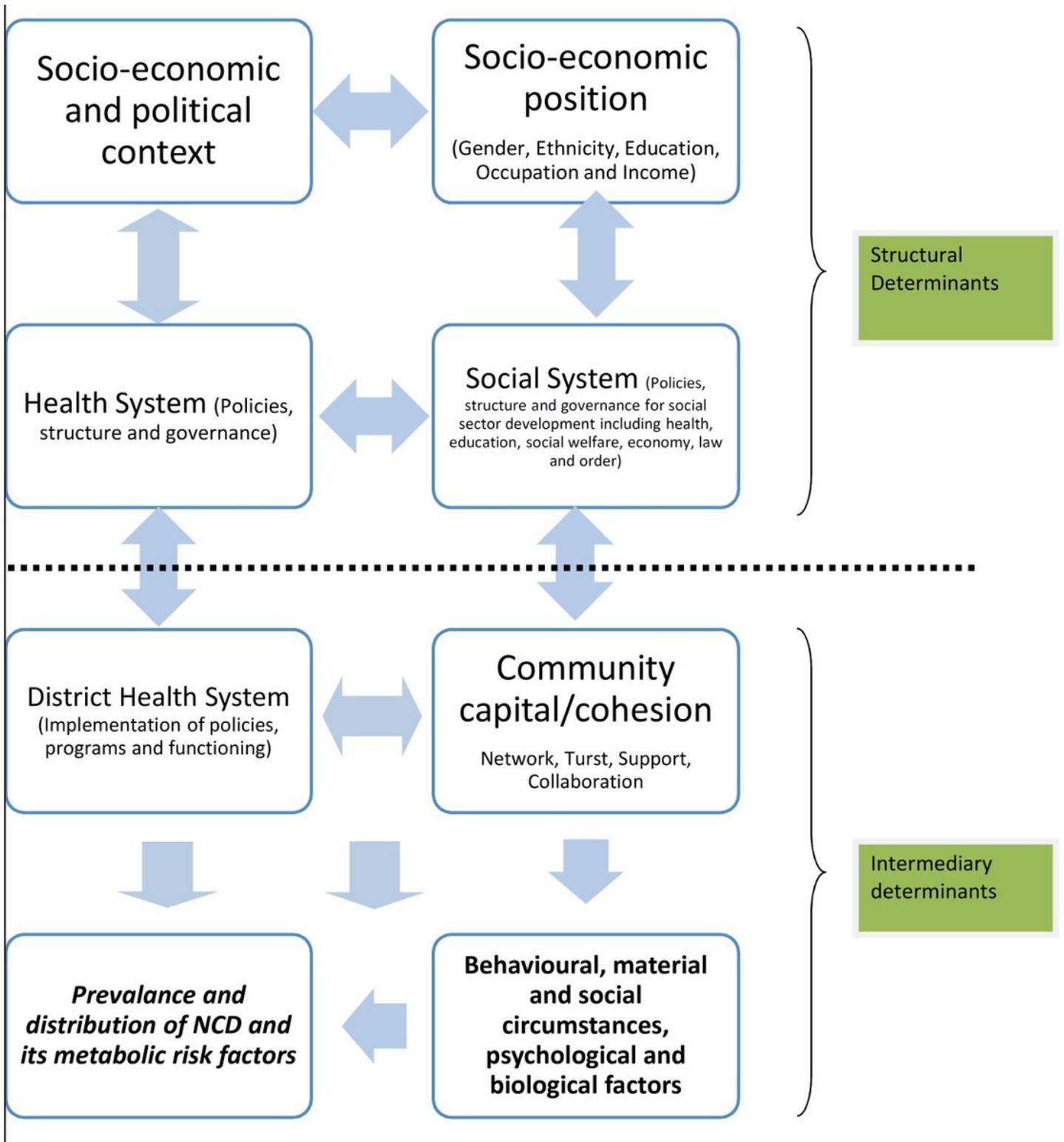


Figure 2

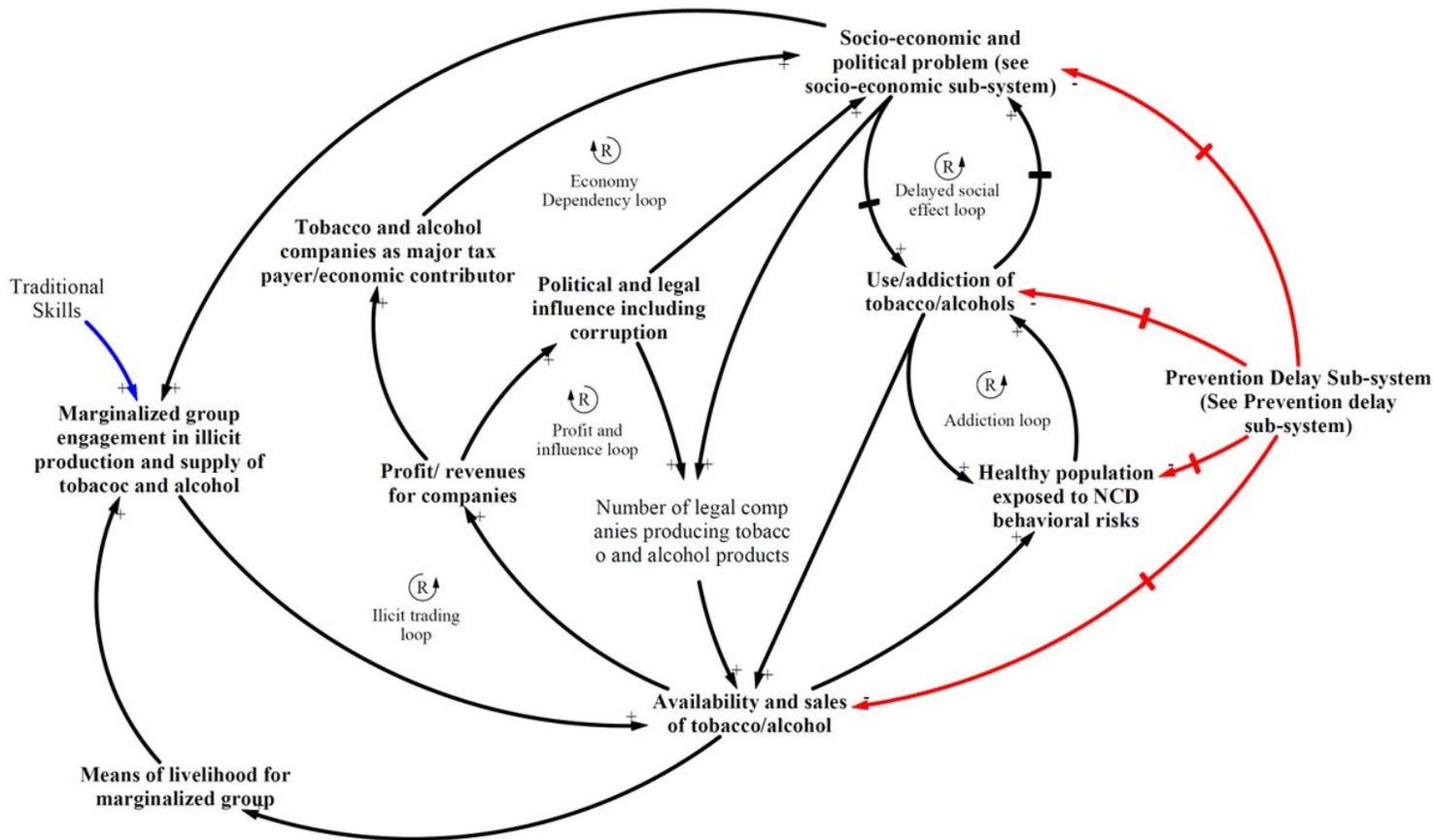


Figure 4

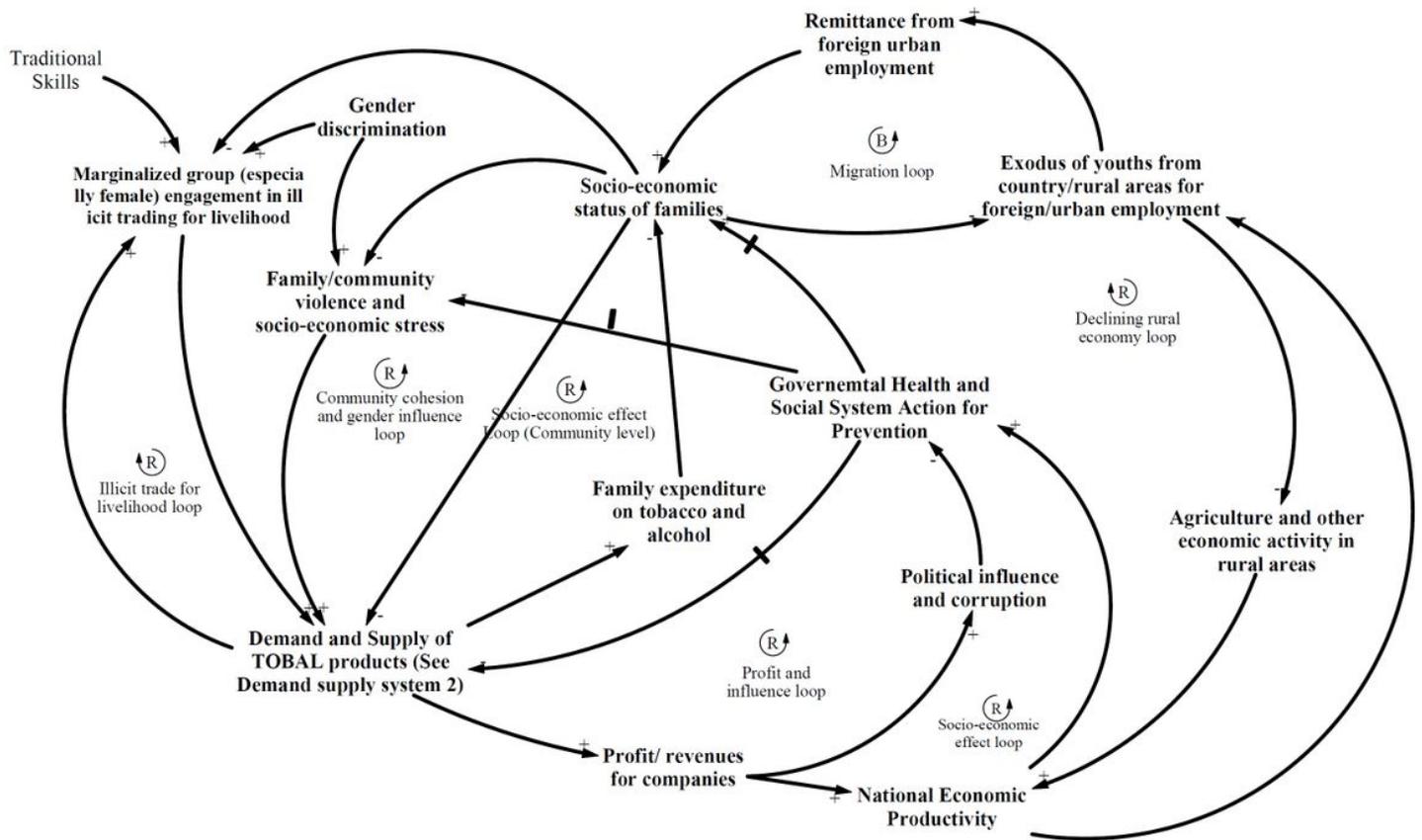


Figure 5

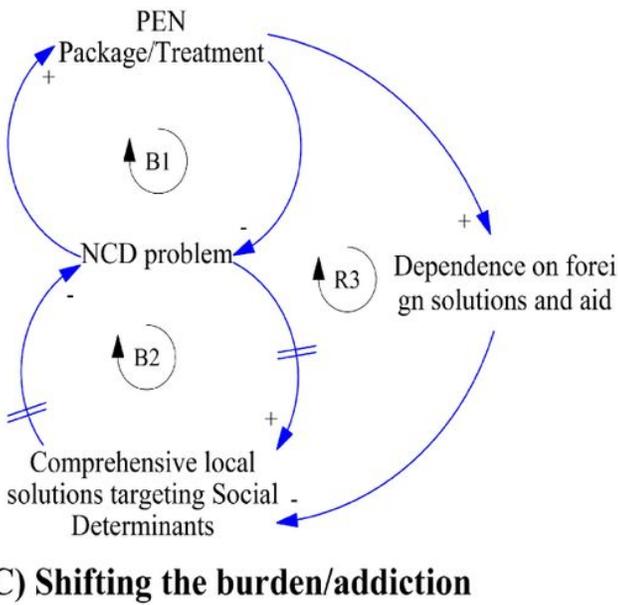
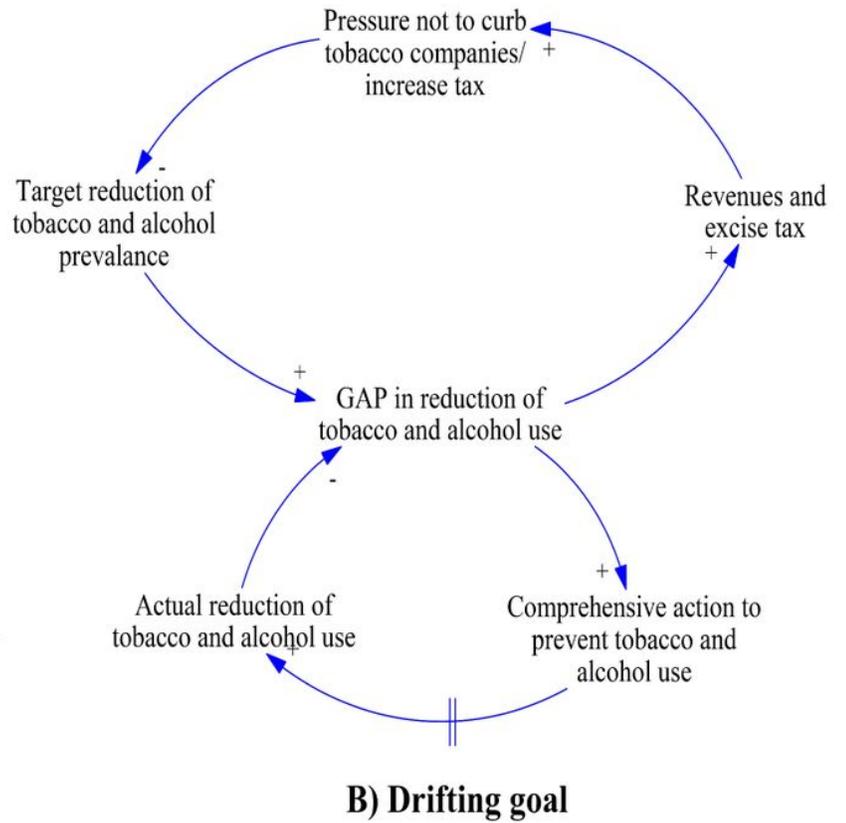
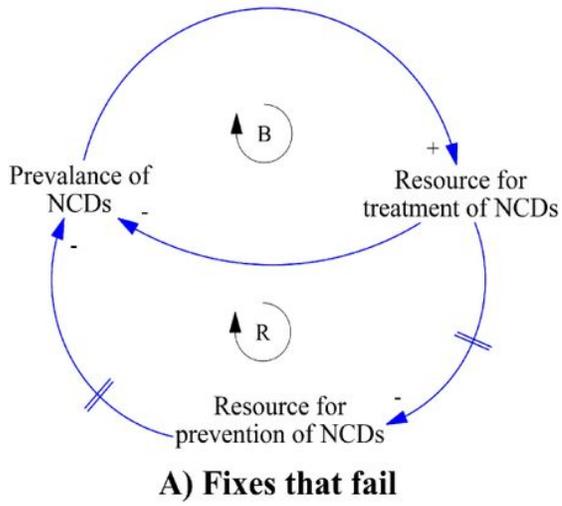


Figure 6