Perspectives on community health issues and the mining boom–bust cycle

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The health of mining communities is becoming a priority for the mining industry, governments, and researchers. This paper describes an exploratory qualitative study into community health issues and mining activities (associated with the mining boom–bust cycle) from the perspective of health and social service providers in the northern Canadian coal mining community of Tumbler Ridge, British Columbia. Health and social service providers report on increases in pregnancies, sexually transmitted infections, and mine related injuries during booming mine activities. During bust times, mental health issues such as depression and anxiety were reported. Overarching community health issues prominent during both boom and bust periods include burdens to health and social services, family stress, violence towards women, and addiction issues. This paper concludes by providing recommendations as to how the industry can enhance community health made by this important stakeholder group.

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Introduction

Today, governments, non-governmental organizations, communities, and mining organizations expect mining companies to plan for and mitigate health impacts associated with development projects. The mining sector has recognized the importance of health, and has made specific commitments to enhancing the health of associated communities. For instance, the International Council on Mining and Metals (ICMM) identifies in their sustainable development framework that corporate members are committed to implement and measure their performance against ten principals. Under Principal 5: Seek continued improvement of our health and safety, the ICMM includes implementing “a management system focused on continual improvement of all aspects of operations that could have a significant impact on the health and safety of our own employees, those of contractors and the communities where we operate” [International Council on Mining and Metals, 2008, p.10]. These commitments recognize that “beyond work related diseases, few endeavours attempt to prevent diseases that affect the wider community or to consider the community’s broader well-being” (Mining, 2002); and that “Ensuring that improved health and education or economic activity will endure after mines close requires a level of planning that has too often not been achieved” (Mining, 2002, p. xvii). The following section highlights literature related to community health and the mining sector as developed by international organizations over the past decade.

The most comprehensive report available to date related to mining community health is the literature review of worker and community health and mining by Stephens and Ahern (2001) as part of the Mining, Minerals and Sustainable Development (MMSD) project. This review identified that mining community health research has historically focused on community exposure to environmental toxins (Stephens and Ahern, 2001). The final report of the MMSD project Breaking New Ground reports community health as an important parameter in their chapter on Local Communities and Mines (Mining, Minerals and Sustainable Development Project, 2002, Chapter 9, p.203). However, the description of community....
health issues is limited to four paragraphs and lacks a detailed description of issues a mining company can/should address in sustainable development/community relations planning (Mining, Minerals and Sustainable Development Project, 2002). In 2003, the International Finance Corporation (IFC) identified potential health impacts associated with private sector projects in emerging economies to include: changes in nutritional status, mortality and morbidity, HIV and other communicable diseases, endemic diseases, impacts of in-migration on health services and associated infrastructure, and environmental (exposure) health impacts (International Finance Corporation, 2003, p. 12). More recently, the IFC released a guidebook to introduce the health impact assessment (HIA) procedure with main objectives of: providing guidance to associated corporations in relation to the HIA process, and assisting in assessing potential impacts to community health as a result of project development. However, the HIA process as outlined by the IFC is limited to environmental health areas, and does not mention health issues associated with other determinants of health (International Finance Corporation, 2009).

Although nutritional status, communicable diseases such as HIV, and illness stemming from exposure to environmental toxins have been highlighted as important issues for the mining industry to consider, plan for, and mitigate, today the mining sector is engaged in directives that commit to sustainable development and corporate social responsibility. These commitments require the industry to update the concept of community health, and to incorporate this consideration into mine planning. The World Health Organization (WHO) defines health as "a state of complete physical and mental and social well being and not purely the presence or absence of disease" (World Health Organization, 1948, p. 100) and "the extent to which an individual or a group is able, on the one hand, to realize aspirations and to satisfy needs, and on the other, to change or cope with the environment" (World Health Organization, 1986, p. 1). Recently, the mining sector published an important document regarding the health of communities: the International Council on Mining and Metals (ICMM) Good Practice Guidance on Health Impact Assessment (International Council on Mining and Metals, 2010). This guidebook represents the first reference material produced by the mining sector that describes health beyond the presence and absence of disease or environmental exposures, and includes other factors that impact health (International Council on Mining and Metals, 2010). Commonly referred to as determinants of health, these factors can include: income and social status, social support networks, education, employment and working conditions, social environments, physical environments, personal health practices and coping skills, healthy child development, social support networks, education, employment and working conditions, and culture (Health Canada, 2004).

To pursue this momentum within the mining sector, to contribute to industries’ efforts to enhance the health of associated communities, and to investigate if communities are benefiting from mining sector community health-specific commitments and guidance frameworks, this paper presents an exploratory qualitative investigation into community health issues and mining activities from the perspective of health and social service providers in a remote Canadian coal mining community. Health and social service providers were chosen to participate in this study for two reasons: (1) health care providers have been recognized as important contributors to health status, and play an important role in shaping the health of a community (Health Canada, 2004), and (2) in order to gain a holistic view of how mining has affected community health, it is important to include perspectives from community residents who have experience with certain social determinants of health (gender, age, income, and education).

This paper is organized as follows. First, the Canadian/British Columbia (BC) mining context is briefly described with a focus on the commitment made to communities. The next section provides a socio-economic description of the study community; Tumbler Ridge, BC. This is followed by a detailed explanation of the study’s method including data collection and analysis, and then presentation of main findings. The final section discusses the results and highlights policy implications for the mining sector, governments, and researchers.

Study setting

Health commitments to mining communities in Canada and British Columbia

In Canada, the health of rural/remote mining communities has garnered little attention, although rural communities in general have become a priority for governments, researchers, and industry. This is especially the case since the global economic recession has left few rural communities unscathed, as many are dependent on natural resource development. As such, the Canadian Government recently recognized the need to strengthen economic prosperity and social cohesiveness in rural communities. As such, $1 billion (CAD) over two years has been allocated, through the Community Adjustment Fund (CAF), to assist rural communities that are heavily reliant on resource-based industries, including mining (Department of Finance Canada, 2009). Western Economic Diversification Canada (WD) is the responsible governmental institution for delivering CAF funds in British Columbia, and to date, a total of 1092 CAF applications have been submitted to CAF, exceeding $2 billion (CAD) in funding requests (Western Economic Diversification Canada, 2010). In Northern BC, 477 CAF applications were submitted for a total of $685 million in program funding. The Northern Development Initiative Trust is an additional example of a current funding strategy targeting the sustainability of northern and rural communities in British Columbia. BC mining municipalities such as Logan Lake, Granisle, Stewart, and Tumbler Ridge have all applied for, and received funds from this initiative (Northern Development Initiative Trust, 2008).

Within the mining sector, additional commitments have been made to communities. For example, in 2004, The Towards Sustainable Mining framework developed by the Mining Association of Canada (MAC), representing many Canadian companies, indicated that MAC members will “provide lasting benefits to local communities through self-sustaining programs to enhance the economic, environmental, social, educational and health care standards they enjoy” (Mining Association of Canada, 2004, p. 1). In the western Canadian Province of British Columbia, the Government committed to supporting “strong, enduring relationships between the mining industry, communities and First Nations; the development and implementation of a made-in-British Columbia approach to sustainable exploration, mining and communities” in their 2005 Mining Plan (Ministry of Energy, Mines, and Petroleum Resources, 2005, p. 11). To recognize achievements in the field and sustainable development, the Mining Association of British Columbia (MABC) and MEMPR identified “enhancing the potential for creating economic, social, and cultural benefits for local communities or regions” as a key criterion (Mining Association of British Columbia, 2009). While the commitments made by MAC, MABC, and the BC Ministry of Energy, Mines, and Petroleum Resources (MEMPR) are strong, mining communities in Canada and BC are at present applying for and requiring financial assistance from federal and provincial sources as a result of the global economic recession. In addition, many mining communities in British Columbia have demonstrated historic economic vulnerability, demographic instability (Shandro et al., 2010), and negative health impacts (Shandro et al., 2010), stemming from declining and/or boom-bust economic and employment conditions.
The study community

Coal in Canada and in BC is an important commodity; BC produced approximately 73% of Canada’s coal in 2008 (Natural Resources Canada, 2009), and coal represented 51% of the BC mining industry’s total net revenues in 2008 (Ministry of Energy, Mines, and Petroleum Resources, 2009). Tumbler Ridge is a remote coal mining community in northeastern BC (Fig. 1), located in proximity to four operating mines. In 2009 coal mines in the Tumbler Ridge region (there were three operating mines in 2009) produced approximately 2,936,000 ton, representing 14% of the total coal produced in BC (Ministry of Energy, Mines, and Petroleum Resources, 2009). Tumbler Ridge is located approximately 1200 km northeast of Vancouver, the largest city in BC. The municipality of Tumbler Ridge, along with the nearby communities of Chetwynd and Dawson Creek, belongs to the Peace River Regional District. The regional climate is comprised of long cold winters and short cool summers (District of Tumbler Ridge, 2009).

To date, Tumbler Ridge represents the last community in BC to be developed under the Instant Towns Policy (Campbell, 1965) to support the extraction of 100 million tonnes of metallurgical coal destined for Japan. Planning for Tumbler Ridge began in 1976, following applications to develop two open pit coal mines (the Bullmoose mine and the Quintette mine). Size and infrastructure requirements for the proposed projects and town development required a partnership between the provincial government and the mining corporations. The provincial government was responsible for town site planning and infrastructure of public areas, contributing an unprecedented $1 billion towards this effort. Companies were responsible for mine development and construction of employee housing within the town site (District of Tumbler Ridge, 2005). Incorporated on April 9, 1981, inhabitance and mining in the Tumbler Ridge area began shortly after in 1983. By incorporation, both of the first two coal mines in the Tumbler Ridge area were in operation.

A large proportion of the community’s population was employed at the Quintette and Bullmoose mines. For example, in 1991, 57% of the total number of employed people in Tumbler Ridge worked in the mining sector (Statistics Canada, 1991). Declining coal prices and the subsequent collapse of global coal resulted in premature closure of the Quintette Mine in 2000 (Jen, 2000), prompting a decline in mining employment by over 40% (Statistics Canada, 1991, 2001). The smaller Bullmoose mine closed shortly after, due to ore exhaustion (Jen, 2003). As a result of the Quintette and Bullmoose mine closure, many people departed from Tumbler Ridge to pursue other economic opportunities (District of Tumbler Ridge, 2005). The first census population record for Tumbler Ridge was 4387 residents for 1986 (BC Stats, 2007). In 2001, coinciding with closure of the Quintette Mine, the population plummeted to 1851 (BC Stats, 2001).

In July 2002, an attempt to sustain the community was made through an innovative housing transfer and sale. Houses in Tumbler Ridge were previously owned by mining corporations, and as a contribution to the sustainability of the community, these homes were sold at well below assessed values. This led to approximately 900 sales of vacant homes, with many purchased “sight unseen” (District of Tumbler Ridge, 2005, p. 5). A large proportion of homes was purchased by retirees (District of Tumbler Ridge, 2005), and relocation of these individuals radically shifted the demographic composition of the community. Post-housing sale, the community began to diversify into the tourist sector, and attracted oil and gas, wind power, and forestry development.

Despite economic diversification, mining has become the dominant employer again in the Tumbler Ridge region as a result of elevated coal prices and increased demand for metallurgical coal. In addition to the four operating mines, there are three mine projects in the Environmental Assessment process, and three in the exploration/development stage. The population has rebounded to an estimated 3500 with a future projection of over 6000 (District of Tumbler Ridge, 2010). In addition, housing is in high demand: rental properties are coveted, and homes once purchased when the Quintette Mine closed for approximately $25,000 are now selling for $199,000 (CAD) (District of Tumbler Ridge, 2010). The altered demography of the community has posed additional challenges. The original development of the town seemingly lacked consideration of needs for aged or disabled populations. As examples, all residential homes had stairs, no elevators were installed in service buildings, automatic doors and transportation options were nonexistent, and support services were designed for a younger demography (District of Tumbler Ridge, 2008).

As of October 2009, all health and related services were available at one location. Services included: a family practice run by two physicians, 24 h emergency services (through a diagnostic and treatment center) serviced by three nurses and the two family physicians (with one physician available from Dawson Creek), mental health and addiction counseling, Safe Home Project, Women’s Crisis, public health, home care, X-ray and laboratory services, massage therapy, optometry, and visiting specialists.

Study design and methods

This exploratory study was informed by qualitative research methods and based on the assumption that experiences and perceptions of health and social service providers are integral to understanding how mining activities may affect community health issues. Qualitative research has proven to be of great value in the field of health and policy (Sofaer, 1999). While it was guided by a grounded theory approach (Glaser and Strauss, 1967, Corbin and Strauss, 2008), the final aim of the analysis did not include the development of a theoretical model. Rather, data gathered from interviews were used to generate rich descriptions of mining community health issues. Ethics approval for this study was granted by the University of British Columbia Behavioural Research Ethics Board (certificate # H09-00251).

Recruitment and sampling within the community

Participants were a purposeful sample (Corbin and Strauss, 2008) and met the following criteria: employed in the community...
health or social service sector and had worked in their respective position long enough as to have experienced a boom or bust in mining activity in their community. A boom was defined as a period of time when mining operations had been initiated through a period of time where production and jobs were stable; a bust was defined as a period of time marked by mine closure. Key health and social services in the community were first identified, and administrators of these services were contacted as possible participants. They were thought to have the best working knowledge of overall community health impacts and could provide a broad overview. They also assisted us in identifying additional potential participants.

Within the community a total of 13 potential participants who met the recruitment criteria were identified. These individuals held positions as hospital administrators, physicians, nurses, mental health and addictions counselors, women’s health counselors, crisis outreach workers, health consultants, and community policy makers, who had strong knowledge of the mining sector and of general community health issues (such as municipal mayors). Out of the 13 candidates, 10 were recruited and interviewed. Interviews were conducted with 4 men and 6 women; seven health care providers and three social service providers. Of the ten participants, six had spent over a decade in the Tumbler Ridge area and were employed during the closure of the Quintette and Bullmoose mines. One social service provider had previously been employed with the Quintette mine and had played an important role in developing community health and mine workers health programs (such as mine site addiction counseling and the community transition house for abused women).

Data collection

Data collection involved field work, observations, and interviews with the participating health and social service providers, which took place between May and November 2009. Field work activities included reading local newspapers and histories of Tumbler Ridge and the surrounding Peace River Region; informal conversations with mining industry representatives and local policy makers; visiting local health authorities; attending a regional mineral development forum; and participating in a workshop between mining industry representatives, local health care providers, and community leaders to discuss mining community health and sustainability (Shandro et al., 2010). Various governmental, academic, mining, and community documents associated with Tumbler Ridge were also collected and read. In addition, informal conversations with mining industry and community representatives were held. This was an important phase of the research process as it allowed for the contextualization of data gathered from interviews with the health and social service providers.

Interviews were semi-structured; this style of interviewing elicits participant viewpoints (Creswell, 2003), and allows for reliable comparable qualitative data (Cohen and Crabtree, 2006). Interviews were conducted by the first author (JS) who had had training in qualitative data collection. The interviews consisted of open-ended questions and were of a conversational nature. They focused on general community health issues and health issues specific to men and to women as related to the boom and bust cyclical nature of mining. Participants were also asked to provide their opinion on how the mining industry could contribute towards improving community health. Each participant provided informed consent, including permission to audiotape the interview. Interviews took place in Tumbler Ridge, in the interviewee’s office or meeting room, or via telephone. Each interview lasted between 45 and 60 min. Observations and additional field notes were recorded during and after the interview. Member checks were conducted in real time (during the interview) and in follow up to ensure accuracy of data and interpretation.

Data analysis

Utilizing grounded theory techniques, this study involved simultaneous and sequential collection and analysis of data using inductive, constant comparison methods (Corbin and Strauss, 2008). In following this approach, data analysis began with the completion of the first interview (Glaser and Strauss, 1967; Corbin and Strauss, 2008). Interviews were transcribed verbatim and field notes synthesized with transcripts. Interview transcripts were reviewed and data analyzed using open coding and the constant comparison method (Corbin and Strauss, 2008) to identify emergent themes that described community health issues in Tumbler Ridge.

Results

Health issues related to the mining boom–bust cycle, which were described by interview participants, have been organized under the following themes: Family Health, Women’s Health, Mental Health and Addictions, Mine Workers Health, and Health and Social Services. The final section of the results reports on the recommendations that the health and social service providers had for the mining industry to consider. Each theme includes participant quotes to illustrate important aspects of the theme and are identified by interview and transcript line number (e.g. I1L25 would be interview #1, line 25 on transcript).

Family health

“Family is so important for one’s health” (I2L200). Most participants identified family as being key to the health of the overall community and to individuals during boom and bust periods. Working conditions at the mine during boom times and stress during bust times were key factors affecting the family and were attributed to divorce, violence, and stress. Family was also considered by participants to extend beyond the nuclear family to include others involved in the mining community. For many interviewed, the notion of family went beyond immediate relatives, “there is a network of people that know each other; generations of families have moved here” (I2L149). For people that did not have kin in the community, “your neighbors and your friends become your family” (I3L284); “you became family with each other, no one was born here” (I3L279). All participants identified closeness with one another, and related this to mining having brought them together.

For many families, at least one parent works at the mine, and this parent was usually the father/husband. Almost all participants identified the mining shift rotations as stressful for both parents. They identified that for mothers, there were difficulties securing child care, meaning many stayed at home with their children. With the long shift rotations “It’s a disconnect when he’s away” (I1L202). For fathers, “When you get up at 5 to go to work and you get home at 8:30, when you’re doing a daytime shift, you’re exhausted; you eat and go to sleep. There is not any connection on that kind of shift with the family and what’s going on with the family...” (I2L182).

All participants identified bust periods as stressful for families. There were financial hardships, the process of moving a family to a different community to find new employment, and uncertainty about the future. Bust periods were also identified by participants as particularly difficult times for families who stay in the community. Many men embarked on long distance commuting that
contributed additional strain for the nuclear family. This employment option, often referred to as fly-in fly-out operations, typically entails two weeks away working at a remote location, and two weeks of time off when the worker can return home.

It’s just very tough having a family, and having to move, when you don’t want to move. And then you had the other folks that were staying regardless, listen we’re prepared to wait one or two or three years for things to comeback, and they’re hoping they made the right decision, and that in itself is stressful. And there is no income for a few years” (I8L251).

Family counseling was available in Tumbler Ridge during the operations of the Quintette and Bullmoose mines. However, with the decline in population that occurred as a result of mine closure, this health service was eliminated by the Northern Health Authority. As of October 2009, it was reported that family counseling was not available to the residents of Tumbler Ridge.

Women’s health

The health of women in the community was a prominent topic amongst participants in relation to the boom–bust mining cycle. A range of issues was described that relates to women’s health, including maternity and sexual health, domestic violence, and a lack of employment opportunities (while employment itself is not a health outcome; it has been recognized as an important determinant of health (Health Canada, 2004)).

During boom times it was described that there “were more men than women, more std’s, more pregnancies” (I6L533). Many participants associated the mining boom with the fact that “We’ve got a huge increase in maternity cases here and we’re having to send them out for fairly simple maternity care” (I10L141). While there is a Diagnostic and Treatment (D&T) center in Tumbler Ridge, maternity care is not a health service that providers are able to manage as the D&T center does not have overnight beds, and is not equipped to perform surgical procedures. Participants identified that for expectant mothers, the lack of maternity health services and the isolation of Tumbler Ridge have compounded an already stressful situation: “your ideal situation is we’re an hour and a half from Dawson Creek, in good weather, and so if you try and deliver here, and something unexpected goes wrong, and you need your c-section, you have an hour to two hours from actually getting there, and in the first world these days, that’s considered too long” (I18L223).

It was also reported by three participants that violence against women is a prominent issue in Tumbler Ridge during both boom and bust times. It was described that in more cases than not, women tend to remain in the abusive relationship.

“Say I have a woman who wants to leave an abusive relationship. The way it stands now, is she basically needs to leave the community. Because we don’t have a transition house” (I2L109).

The municipality of Tumbler Ridge does have a Safe Home program, a service that provides abused women a safe place to stay if they are in need. However, as reported by participants, the service is only available for a couple of days, after which the woman must make alternative arrangements. During the 1990s, Tumbler Ridge had a transition house (that was reported by one participant as funded by Teck Corporation, the now Teck Resources Ltd.); however this service was reported to be lost with the closure of the Quintette mine. This situation is exacerbated by the fact that as of October 2009, the community also did not have a social worker. The social worker position (who has the authority to process income assistance forms) was reportedly eliminated by the Northern Health Authority with the closure of the Bullmoose and Quintette mines. As a result, women neither have safe place to transition out of an abusive relationship nor do they have any means to gain financial independence, through assistance programs to leave the community or relationship. Violence against women was reportedly one of the top three priorities for the Tumbler Ridge Royal Canadian Mounted Police detachment in 2008 (Peats, 2008).

In addition, interviewees identified the lack of employment opportunities available to women in the community.

“Women tend to work in the home. There are lots of women working at the mine, but they don’t have children. Daycare is hard to find with mining hours. The day care is only 8–5. There isn’t a lot of 8–5 jobs” (I2L153)

For those women who have gained employment in the mining sector, sexual harassment is an additional issue: “The women who are working at the mines, sexual harassment is still very prevalent from what they tell me…They just learn how to sluff it off…” (I2L140).

Mental health and addictions

Mental health and addictions were described by 9 participants as being an important health issue during both boom and bust times. Six participants interviewed were practicing health/social service providers in Tumbler Ridge during the closure of the Quintette and Bullmoose mines. They indicated that for residents that remained during the mine closure, it was an emotionally challenging time. Specifically, mine closure coincided with increased reporting of stress, anxiety, depression, and alcoholism.

“the appropriate response um for a community that’s facing death and for people that are having to unexpectedly relocate, I mean you get all sorts of increases in stress related issues, psychological related issues, depression issues, um people knowing that their insurance is going to run out, so they come in quickly to get, to ask you for a three month prescription, so that they’re still covered” (I8L247).

In 2004, mining returned to the Tumbler Ridge region, and mineral development activities have steadily increased. Coinciding with the increase in mining, participants identified that “the counseling department is always busy” (I6L359). They also identified that drug use and addictions were “not as big an issue back then (referring to the first round of mines operating from 1983 to 2000) as they are now. There wasn’t crack, and there wasn’t meth and there wasn’t these other things that we now have” (I3L247).

Participants also reported that drugs have played a critical role in the crisis of young families in Tumbler Ridge and indicated that daily crisis calls are prevalent for drug-family related issues. During the field work, the impact of the global economic recession was felt in the community as one of the operating mines laid off employees. It was reported that the reduction in mine employment coincided with “lots of depression, and anxiety. It’s not just the workers that’s affected, it’s their families as well. And, a lot of people are quite shocked about it, about what will happen next, and lots of people leaving town also because of that” (I7L84).

Miner’s health and safety

In addition to family health, mental health, and addictions issues, three participants who worked in the Tumbler Ridge health sector for over a decade identified that the nature of mine
related injuries have changed. It was the perception that the “mining nature of some of the emergencies coming in are more significant and severe now” (I4L386). In addition, it was reported that “there is an impetus by the industry to not allow the employees to actually leave the work site to go for health care (due to the length of shift time), so what is happening is we have people coming in quite ill at the end of the shift where they should have been seen earlier” (I4L411). These participants also questioned the skill or confidence level of mine site first aid staff, as some of the miners’ injuries brought to the emergency services center were not felt to be appropriate emergency situations, and should have been handled by a first aid attendant. They also expressed concern about the level of health and safety training miners received, and indicated that most of the significant injuries were amongst young males. According to one participant, the average age of a miner in Tumbler Ridge is 55 years old, and no physiotherapy or occupational therapy services have been available in the community since these services were cut by the health authority after the closure of Quintette and Bullmoose mines. In British Columbia, Open Pit Coal mining has the lowest injury rate and this rate has been declining over the past decade (Mining Association of British Columbia, 2010).

**Health and social services**

As highlighted in the above sections, many health concerns outlined by health/social service care providers are associated with the lack of specific services available within the community. All participants identified that both boom and bust times have strained health services. As a result of mine closure, and the subsequent decrease in population, health services were cut rapidly by the Northern Health Authority.

“It has been extremely challenging for the residents of Tumbler especially the long term who stayed, because with that comes knowledge and we went from boom to bust to boom so quickly. The resources provincially and federally are certainly not there in a timely fashion, to accommodate those changes” (I3L221).

Three main themes emerged from the data in respect to the challenges faced by health services as a result of the boom–bust mining cycle. The following quotation clearly defines the first:

“The health care, the basic services are always there, but you’re dealing with different age demographics when you have your boom; you’re dealing with a lot of younger people, young families, new families, children, and when we have the bust we dealt with more seniors. Seniors came to this community based on the availability of cheap housing, so the basics are covered, but they lack services that were not covered here initially” (11L24).

As Tumbler Ridge is a small, northern, isolated community, many of the health and social services required for an aging population are simply not available. All participants reported on this fact as being an on-going critical issue for the health of seniors, who when relocating to the community played an integral role in sustaining the community.

The second theme is the relationship between a booming community and community health services. All participants identified that the mining boom cycle has strained available health services to an unprecedented level.

“The problem was we had this big influx of people who need these services more than ever, and yet the services were never brought up to the levels they were before and it’s always tricky to get them back to those levels again” (11O1L100).

There was also great concern for fellow health care and social services workers and their personal health status as many are working or on call 24 h a day, 7 days a week. Many participants reported that they feel overworked, but that there is no other option, as they are the only service provider (or one of two) in the community who can lend assistance.

“And, we used to have 6 or 7 nurses in town, but now with the same population, now we have 2. So we have 2 emergency nurses, so just one on one off at any one point in time. So that’s catastrophic and this is the risk, and I’m not going to mention their exact ages, but they are both over 50, one’s in the mid 60’s, you know, could be a retirement age if she chose to. And, there’s certainly the risk of burning out there for them” (I8L394).

**Contributing to community health**

Health and social service providers had recommendations as to how the mining industry could contribute to improving community health in Tumbler Ridge. These recommendations include:

**Enhance contact and collaborate with health/social service care providers**

Participants (one of which was in a higher administrative position) recommended that mining corporations and the health authority need to strengthen their relationship.

“Whenever a new mine or any industry moves into the region it would be nice to have a courtesy call” (I4L445).

They identified the need to educate the mining industry on available services, and suggested a strengthened relationship could lead to benefits for both industries. Examples given included the suggestion that the mine and health authority could engage in joint training, revolving around healthy living, workplace safety, nutrition, with a focus on a preventative approach, rather than a prescriptive perspective.

**Assistant health services**

Assistance to health services through financial contributions, the provision of additional health personnel at the mine site or through hiring practices as means to bring qualified health personnel to the community (considering the spouses occupation if all other factors are equivalent between job candidates) were considered as important in elevating the burden on health services that was (as of October 2009) occurring.

“Encourage the mining industry, they should hire an occupational health nurse—have people on site to take care of minor health needs, this would reduce stress on services after hours. And when they are recruiting, look at spouses and how they can contribute to the community” (I5L524).

**Investing in the health of mine workers, their families and communities**

As the community provides a home for the employees working at the mine, participants recommended that the mines could improve their role within the community. It was identified that community programs that target addictions and family counseling would be very helpful: “Drug testing is important. We know there are a lot of folks going to work (to the mine) every day whether it’s on wake ups or other things” (I3L373).

It was also suggested that mining corporations take a serious look at the shift schedule, as the current shift length and a rotation were not viewed as beneficial for workers, families or
the community. It was also recommended they also take more of a leadership role.

“Restructure what your position is in the community. What are your responsibilities as an industry? What do I owe this community? This is where all of my workers live. What is it that I can do to improve the lifestyle and the retention of people within the community? And that can be done a number of ways. And I believe, if you have a mining corporation, and we have a couple or three of them here in town, that I think together they could change a whole lot of things that are going on in our community that aren't right. And do it in a sincere way. Right now, the biggest problem is booze and drugs. Take an honest look at it, it’s your employee that you’re investing in. How he lives in his 12 hours off are just as important to you as how he spends his 12 hours at work. And if you start to adopt some of those kinds of thinking, you can make a pretty good community. But if you continue to go down the road of always saying well it’s not my problem, what did you do as an industry? You didn’t do anything” (IBLS95).

Discussion

Research findings illuminate distinct community health issues associated with the boom and bust cycle of mineral development. This is supported by the perceptions of interviewed health care and social service providers in the community of Tumbler Ridge, many of whom have been employed since the early 1990s and experienced the closure of Quintette and Bullmoose mines, and the subsequent opening of new mines. During boom times, health and social service providers in Tumbler Ridge have seen an increase in pregnancies, sexually transmitted infections, and mine related injuries. Employment opportunities, an important determinant of health (as recognized by Health Canada), were reportedly overburdened, understaffed, and in some cases impacted during boom and bust periods. At present, they are reportedly overburdened, understaffed, and in some cases important services required for the health of the community are lacking altogether.

Past literature is supportive of the current research findings: cyclical economic periods have generally resulted in fluctuations in population levels, often leading to shortages in housing, education, and health services during boom periods (Petkova et al., 2009; Ednie, 2003). In the Australian context, 12 h shifts and continuous rosters have also been reported to negatively impact families and mining communities (Bereton and Forbes, 2004). Mining boom and bust periods have been associated with increased levels of substance abuse (Miranda et al., 1998; North Slave Metis Association, 2002; Sosa and Keenan, 2001; Oxfam, 2009; Campbell, 2000; Emberson-Bain, 1994; Desmond et al. 2005; Yukon Conservation Society and Yukon Women Council, 2000) and gambling (Yukon Conservation Society and Yukon Women Council, 2000), family instability, abandonment and divorce, and child neglect (Yukon Conservation Society and Yukon Women Council, 2000; Sosa and Keenan, 2001; North Slave Metis Association, 2002). Demanding schedules and shift work, which are typical of mining occupations, often result in less time for families and traditional activities in periods of “boom”. Child care problems can be further exacerbated if both parents work (Sosa and Keenan, 2001). A 1994 study of mental health outcomes among miners in the United Kingdom found higher rates of psychological distress and morbidity in miners two years after a mine closure compared to working miners and to workers in other professions (Avery et al., 1998).

Study findings are also consistent with results from other investigations on the impact of the economic environment on the health of residents of British Columbian communities that are primarily based on resource extraction and processing. For instance, research conducted in Northern BC into the influx of transient resource-based workers, with high disposable incomes, has had demonstrated a negative impact on the health, especially of already vulnerable residents, in one northern BC community dependent on oil and gas (Goldenberg et al., 2008a, 2010). Goldenberg et al. (2008a, 2008b, 2008c, 2010) also identified an acute lack of important basic health services in this community. In addition, Ostry and the New Emerging Team for Health in Rural and Northern British Columbia (NETHRN-BC), a research program devoted specifically to understanding the relationship between adverse social and economic conditions and the health of rural and northern British Columbians, have demonstrated the links between adverse economic conditions in some of these communities and adverse health outcomes among residents (Ostry et al., 2000a, 2000b, 2001, 2002 Ostry, 2003; Ostry, 2009a; Ostry et al., 2009b; Ostry, 2009c; Nelson et al., 2010).

While a concise legal framework in Canada is lacking to prevent or minimize health and social issues associated with mineral development (Clark and Clark, 2005), consideration of these issues are generally embedded within health and social impact assessments. In Canada, their inclusion is often amalgamated with the Environmental Impact Assessment (EIA) process, the primary method used to decide whether a mine project is granted authorization to get off the ground and to mitigate potential impacts (Environment Canada, 2000; Kwiatkowski and Ooi, 2003). Findings from the current research project throw into question the effectiveness of the EIA process in mitigating community health impacts. Using Mine EIA certificates and applications in the Tumbler Ridge region as an example, not one of the 128 commitments made by Western Canadian Coal (WCC) in the EIA certified Wolverine Coal Project (certified in 2005) mentions the mitigation of potential community health impacts for Tumbler Ridge (Environment Assessment Office, 2005).

In contrast, the 2008 EIA certificate for the Hermann Mine, WCC, addresses issue #89 Increased demand on health and emergency services by committing to “participating with agencies charged with the responsibility of monitoring and managing the quality of community care” (Environment Assessment Office, 2008, p. 13) and will support “health needs of mine workers through the Employee Assistance Program which provides professional counseling for employees and dependants on various areas of concern including drug and alcohol issues” (Environment Assessment Office, 2008, p. 13). Similarly, in the current EIA application for the Roman Mine by Peace River Coal (application made on March 29, 2010), the same commitments are made (Peace River Coal, 2010, p. 18–53). These commitments, in addition to the commitments made by mining related agencies as reviewed at the beginning of this paper, bring into question the very mechanisms in place to reduce mining related impacts. Based on the findings of this study, future research should focus on investigating the effectiveness of the EIA process in mitigating health and health services impacts, and also on the actual employment of mining agency guidance tools.

The provincial government also has an important role to play in the health of mining communities, especially considering that in 2009, the BC mining sector made $413 million (CAD) in payments to the BC Government (Pricewaterhousecoopers, 2009). As the BC government houses the regulatory agency responsible for approving EIA applications (The Environment Assessment Office), it is recommended that future EIA applications should include the
recommendations outlined in this paper, and mechanisms for monitoring EIA commitments should be strengthened to ensure previous obligations are enacted. It is also recommended that governments be more proactive, and that intergovernmental ministries collaborate (such as the Ministry of Health and the Ministry of Energy, Mines and Petroleum Resources) to ensure that communities aiding in the generation of massive provincial revenues are allocated adequate health and social service funds and personnel to support such ventures.

Finally, as the World Bank, the United Nations, ICMM, IEED, and the IFC attempt to guide the global mining sector to consider health in their sustainable development/corporate social responsibility/mine planning strategies, the recommendations made by health and social service providers are perhaps the most valuable to those guiding mining policy as they stem from individuals who are professionals and experts in the field of community health. To summarize their recommendations on how the industry could contribute towards the enhancement of community health, the path forward is simple: communicate and collaborate with health sectors during development and closure planning, and contribute to the health of workers, their families, and the communities in a meaningful way.

Conclusion

In conclusion, this study took place in a northern Canadian community that was developed purposefully to support coal mining, and focused on how health and social service providers perceive the mining boom–bust cycle to affect community health. This paper reports on the perceptions that the mining boom–bust cycle has negatively impacted health outcomes for the residents of this community. This paper also reports on recommendations from health and social service providers to enhance the health of this community. Specifically, the mining industry at large, community planners, impact assessors, and policy makers should take the interviewees focus on: the provision of family counseling services to mitigate negative impacts to family structures resultant from current mining shift rotation schedules; ensuring women have access to appropriate health care services (such as transition housing and maternity care) and opportunities for important determinant of health issues (such as employment and child care options); enhancing drug and alcohol policies and support services at the mine site and in the community at large; increasing safety training opportunities for miners and ensuring adequate rehabilitation services are available in case of injury; and guaranteeing a company’s presence is not overburdening important health services taking an active role in participating in community health provision (through funding health services) and by collaborating with the appropriate government authorities to ensure adequate funding has been allocated to support the increased demand on health and service delivery. Consideration of these issues is important, as this study suggests that commitments made by the industry and governments to communities are, at least in the case of Tumbler Ridge, BC, falling short.

Brereton, D., Forbes, P., 2004. Monitoring the impact of mining on local commu-


UBCM, New Westminster, p. 80–90.


