



# **2016 Report on Suicide Mortality in the Canadian Armed Forces (1995 to 2015)**

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# 2016 Report on Suicide Mortality in the Canadian Armed Forces (1995 to 2015)

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## **Abstract**

Suicide is a tragedy and an important public health concern. Suicide prevention is a top priority for the Canadian Armed Forces (CAF). In order to better understand suicide in the CAF and refine ongoing suicide prevention efforts, the Directorate of Force Health Protection (DFHP) and the Directorate of Mental Health (DMH) regularly conduct analyses to examine suicide rates and the relationship between suicide, deployment and other potential suicide risk factors. This report is an update covering the period from 1995 to 2015.

This report describes crude suicide rates from 1995 to 2015, comparisons between the Canadian population and the CAF using Standardized Mortality Ratios (SMRs), and suicide rates by deployment history using SMRs and direct standardization. It also examines variation in suicide rate by command and, using data from the Medical Professional Technical Suicide Reviews (MPTSR), looks at the prevalence of other suicide risk factors in suicides which occurred in 2015.

Between 1995 and 2015, there were no statistically significant increases in the overall suicide rates. The number of Regular Force males that died by suicide was not statistically higher than that expected based on Canadian male suicide rates. While the suicide rate among males with a history of deployment was not significantly higher than in comparable civilians, rate ratios indicated that there was a trend for those with a history of deployment to be at an increased risk of suicide compared to those who have never been deployed; however, the difference was not statistically significant. These rate ratios also highlighted that, since 2006 and up to and including 2015, being part of the Army command significantly increases the risk of suicide, relative to those who are part of the other commands.

The most recent findings suggest a trend towards an elevated suicide rate ratio (1.48, CI: 0.98, 2.22) in the past decade in those Regular Force males with a history of deployment relative to those Regular Force males without a history of deployment. However, this finding fell just short of statistical significance. Regular Force males under Army command were at significantly increased risk of suicide relative to Regular Force males under non-Army commands (age-adjusted suicide rate ratio = 2.49, CI: 1.81, 3.42), with a trend towards a widening gap between the rates in Army and non-Army command Regular Force males over the past five years. Regular Force males under Army command in the combat arms trades had statistically significantly higher suicide rates (31.65/100,000, CI: 24.51, 40.66) than non-combat arms Regular Force males (16.52/100,000, CI: 13.48, 20.22).

Results from the 2015 MPTSRs is in support of a multifactorial causal pathway (this includes biological, psychological, interpersonal, and socio-economic factors) to suicide rather than a direct link between single risk factors (e.g. Post-Traumatic Stress Disorder (PTSD) or deployment) and suicide.

Suicide rates in the CAF did not significantly increase over time, and after age standardization, they were not statistically higher than those in the Canadian population. However, small numbers have limited the ability to detect statistical significance. History of deployment continues to be a possible risk factor for suicide in the CAF. The increased risk in Regular Force males under Army command compared to Regular Force males under non-Army command is another recent finding. Deployment-related trauma (especially that related to the mission in Afghanistan) and resulting mental disorders are plausible mechanisms for these associations. However, residual confounding may also be at play (e.g. by disproportionate risk of childhood trauma or other lifetime trauma in Army personnel or those who deploy). Further research with other data sources will be needed to explore these hypotheses in depth.



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*Keywords: Age-adjusted rate; Canadian Forces; Canadian population; deployment; rate ratio; rates; standardized mortality ratio; suicide.*



## Résumé

Tout suicide est une tragédie et un problème important de santé publique. La prévention du suicide est une haute priorité des forces armées canadiennes (FAC). Afin de mieux comprendre le suicide dans les FAC et de raffiner les efforts continus de prévention, la Direction – Protection de la santé de la Force (DPSF) et la Direction de la santé mentale (DSM) mènent régulièrement des analyses afin d'examiner les taux de suicide et la relation entre le suicide, le déploiement, et d'autres risques potentiels de suicide. Ce rapport est une mise à jour couvrant la période de 1995 à 2015.

Le présent rapport décrit les taux bruts de suicide de 1995 à 2015, les comparaisons entre la population canadienne et les FAC au moyen des ratios standardisés de mortalité (RSM) et les taux de suicide chez les personnes ayant des antécédents de déploiement au moyen des RSM et de la normalisation directe. Il examine également la variation dans le taux de suicide en fonction du commandement et, au moyen de données tirées des Examens techniques des suicides par des professionnels de la santé (ETSPS), on s'est penché sur la prévalence d'autres facteurs de risque dans les suicides qui ont eu lieu en 2015.

Entre 1995 et 2015, il n'y avait pas d'augmentation statistiquement significative des taux globaux de suicide. Le nombre d'hommes de la Force régulière décédés par suicide n'était pas statistiquement plus élevé que le taux escompté en fonction des taux de suicide chez les hommes dans la population canadienne. Bien que le taux de suicide chez le personnel ayant fait l'objet d'un déploiement ne soit pas beaucoup plus élevé que chez la population civile comparable, les ratios de taux indiquaient que ceux qui ont des antécédents de déploiement présentaient une tendance statistiquement non significative de risque accru comparativement à ceux qui n'ont jamais fait partie d'un déploiement. Ces ratios de taux laissent aussi voir que, depuis 2006 et jusqu'à et incluant 2015, le fait de faire partie du commandement de l'Armée de terre accroît, de manière statistiquement significative, le risque de suicide par rapport à ceux qui font partie d'un autre commandement.

Les constatations les plus récentes laissent maintenant voir une tendance vers un ratio de taux de suicide ajusté élevé (1,48, IC : 0,98, 2,22) au cours de la dernière décennie chez ceux qui avaient des antécédents de déploiement comparativement à ceux qui n'en avaient pas. Toutefois, cette conclusion ne représentait pas tout à fait une importance sur le plan statistique. Le personnel de l'Armée de terre présentait un risque de suicide nettement accru par rapport aux autres militaires (ratio de taux de suicide ajusté en fonction de l'âge = 2,49, IC : 1,81, 3,42), et on note une tendance vers un élargissement de l'écart entre les taux du personnel de l'Armée de terre et ceux des autres militaires au cours des cinq dernières années. Le personnel mâle de l'Armée de terre faisant partie des métiers d'armes de combat présente des taux de suicide nettement plus élevés (31,65/100 000 personnes, IC : 24,51, 40,66) que ceux des autres membres de l'Armée de terre ne faisant pas partie des métiers d'armes de combat (16,52/100 000 personnes, IC : 13,48, 20,22).

Les résultats des ETSPS de 2015 appuient un enchaînement de causalité qui est plus multifactoriel (ceci inclut des facteurs biologiques, psychologiques, interpersonnels, et socio-économiques) plutôt qu'un lien direct entre des facteurs de risques individuels (p. ex. état de stress post-traumatique (ESPT) ou le déploiement) et le suicide.

Les taux de suicide dans les FAC n'ont pas augmenté de façon marquée avec le temps, et ils ne sont pas plus élevés que ceux de la population canadienne lorsqu'ils sont normalisés selon l'âge. Toutefois, le nombre peu élevé de sujets pourrait avoir restreint la capacité à détecter une signification statistique. Les antécédents de



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déploiement continuent à être un facteur possible de risque de suicide dans les FAC. Le risque excessif au sein de l'Armée de terre est également une constatation nouvelle. Le trauma lié au déploiement (particulièrement celui lié à la mission en Afghanistan) et les troubles mentaux qui en découlent sont des mécanismes plausibles de ces associations. Cependant, un effet de confusion résiduel pourrait aussi entrer en jeu (par exemple un risque disproportionnel provenant d'un traumatisme de l'enfance ou d'un autre traumatisme vécu chez le personnel de l'Armée de terre ou chez ceux qui sont déployés) d'autres recherches seront nécessaires pour étudier ces hypothèses en profondeur.

*Mots clés : Taux ajustés selon l'âge forces canadiennes; population canadienne; déploiement; ratios des taux; taux; ratios standardisés de mortalité; suicide.*



## **Executive Summary**

The tragic loss of life of Canadian Armed Forces (CAF) members through suicide require our continued focus to better understand it and guide our suicide prevention efforts. This report describes the suicide experience in the Canadian Armed Forces (CAF). It describes the epidemiology of Regular Force males that died by suicide between 1995 and 2015, with an additional focus on the risk factors associated with the Regular Force males that died by suicide in 2015.

This report is produced in collaboration between the Epidemiology section of the Directorate of Force Health Protection and the Directorate of Mental Health (DMH).

### **Methods**

Data described in Chapter 1 [Results from the Medical Professional Technical Suicide Review (MPTSR)] are collected during the MPTSR process, following a suicide. An MPTSR is ordered by the Deputy Surgeon General immediately following the confirmation of all suicides, and it is conducted by a team consisting of a mental health professional and a General Duty Medical Officer.

Epidemiological data described in Chapters 2 (The Epidemiology of Suicide in the Canadian Armed Forces) and 3 (Selected Analyses on Regular Force Male Suicide in the Canadian Armed Forces, by Command) was obtained from the Directorate of Casualty Support Management up to 2012. As of September 2012, the number of suicides was tracked and provided by DMH. Finally, denominator data (Canadian suicide counts by age and sex) were obtained from Statistics Canada.

Frequencies, standardized mortality ratios and directly standardized rates were calculated.

### **Results**

#### **Demographic Characteristics of Those Who Died by Suicide in 2015**

At the time of event, the majority of Regular Force males who took their own lives in 2015 were married (57.1%) and had completed high school (50.0%). Firearms (35.7%) and hanging (21.4%) were the most common methods of suicide which is similar to methods used in the Canadian male population.

#### **2015 Suicide Event Information**

Alcohol use only at the time of death was confirmed in 14.3% of events, a combination of drug and alcohol use was confirmed in 7.1% of events, and the use of drugs only was established for 14.3% of events.

#### **2015 Suicide Rates in Relation to Care Access**

Care was accessed within a year prior to their suicide by nearly 93% of individuals. Of those that accessed primary care, 76.9% did so within 30 days prior to their death. It should be noted that the care sought may not have been directly mental health-related. Other sources of health care that were accessed included outpatient mental health (71.4%), psychosocial services (50.0%), inpatient mental health (35.7%) and Chaplain services (21.4%).



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### **Mental Health Diagnosis of Those Who Died by Suicide in 2015**

Identified mental health disorders at time of death included depressive disorders (42.9%), trauma and stress-related disorder (35.7%), or an anxiety disorder (28.6%). In addition, 42.9% had a documented substance use disorder. It was common (64.3%) to have at least two mental health factors at the time of death.

### **Work/Life Stressors of Those Who Died by Suicide in 2015**

At the time of death, 92.9% of the Regular Force males that died by suicide in 2015 reportedly had at least one work and/or life stressor (including: failing relationships, friend/family suicide, family/friend death, family and/or personal illness, debt, professional problems, legal problems); half of them had at least three concomitant stressors prior to their death.

### **Crude Suicide Rates, 1995 – 2015**

In 2015, the crude suicide rate of Regular Force males was 24.9 (13.6, 41.8) per 100,000. This was the highest crude rate to date. However, the confidence intervals overlapped between all time periods, suggesting that there was no significant difference in crude rates over time. Additionally, the findings for the last time period include only one year (2015) and should therefore be monitored further to ascertain whether this pattern persists.

### **Comparison of CAF Regular Force Male Suicide Rates to Canadian Rates Using Standardized Mortality Ratios, 1995 – 2015**

As with the crude rates, the confidence intervals for the Standardized Mortality Ratios (SMRs) across the 5-year periods (3 years for 2010 to 2012) overlapped, suggesting that there was no significant change in SMRs over time.

### **Impact of Deployment on CAF Regular Force Male Suicide Rates**

SMRs comparing those with a history of deployment to those without (1995 – 2012) did not identify a statistically significant difference in suicide rate between groups. Using direct standardization for the 10-year time period 2005 – 2014 resulted in a nearly statistically significant suicide rate ratio comparing those with a history and those without a history of deployment [1.48 (95% Confidence interval: 0.98, 2.22)]. This suggests that those Regular Force males with a history of deployment may be at increased risk of taking their own lives, compared to those with no history of deployment. However, deployment may be confounded by other unexplained variables.

### **Impact of Command on CAF Regular Force Male Suicide Rates**

For the period 2002 – 2015, the Army command crude suicide rate among Regular Force males was significantly higher than that of non-Army command Regular Force males [33.32 (27.14, 40.92) versus 13.08 (10.17, 16.81)]. The age-adjusted suicide rate ratio comparing Army to non-Army command was also statistically different [2.49 (1.81, 3.42)]. This finding was supported by a significantly higher Army command SMR in 2007 – 2011 [1.73 (1.23, 2.36)].





## **Sommaire**

La perte tragique de vie des membres des forces armées canadiennes (FAC) suite à un suicide requiert notre attention continue afin de mieux le comprendre et guider nos efforts de prévention du suicide. Le présent rapport décrit le phénomène du suicide au sein des Forces armées canadiennes (FAC). On y décrit l'épidémiologie des suicides chez les hommes de la Force régulière entre 1995 et 2015 et on accorde une attention particulière aux facteurs de risque associés aux suicides chez les hommes de la Force régulière qui ont eu lieu en 2015.

Le rapport est le produit d'une collaboration entre le secteur de l'épidémiologie de la Direction – Protection de la santé de la Force et la Direction – Santé mentale (DSM).

### **Méthodes**

Les données décrites dans le chapitre 1 (résultats de l'examen technique des suicides par des professionnels de la santé [ETSPS]) sont recueillies pendant le processus de l'ETSPS, à la suite d'un suicide. Le médecin-chef adjoint lance un ETSPS dès qu'un suicide est confirmé. L'examen est mené par une équipe composée d'un professionnel de la santé mentale et d'un médecin militaire généraliste.

La Direction – Gestion du soutien aux blessés a fourni les données épidémiologiques décrites dans les chapitres 2 (Épidémiologie du suicide dans les Forces armées canadiennes) et 3 (Sélection d'analyses sur le suicide chez les hommes dans les Forces armées canadiennes, selon le commandement) allant jusqu'à 2012. Depuis septembre 2012, les données sur le nombre de suicides ont été obtenues auprès de la DSM. En terminant, les données utilisées en guise de dénominateur (taux de suicide au Canada en fonction de l'âge et du sexe) ont été obtenues auprès de Statistique Canada.

Les fréquences, les rapports standardisés de mortalité et les taux normalisés de façon directe ont été calculés.

### **Résultats**

#### **Contexte démographique de ceux morts par suicide en 2015**

Au moment du suicide, la majorité des hommes de la Force régulière qui se sont enlevé la vie en 2015 étaient mariés (57,1 %) et avaient terminé le secondaire (50,0 %). Les armes feu (35,7 %) et la pendaison (21,4 %) étaient les deux méthodes de suicide les plus courantes, comme c'est le cas aussi chez les hommes dans la population canadienne.

#### **Informations sur les cas de suicide en 2015**

Au moment du suicide, la consommation d'alcool seulement a été confirmée dans 14,3 % des cas, la consommation d'une combinaison d'alcool et de drogue a été confirmée dans 7,1 % des cas et la consommation de drogues seulement a été confirmée dans 14,3 %.

#### **Accès aux soins liés aux suicides en 2015**

Dans près de 93 % des cas, les gens concernés avaient eu accès à des soins dans l'année qui a précédé leur suicide. Parmi les gens qui ont eu accès à des soins primaires, 76,9 % l'ont fait dans les 30 jours précédant



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leur décès. Il convient de souligner que les soins demandés n'étaient pas nécessairement liés à la santé mentale. D'autres sources de soins de santé ont été utilisées, notamment des services de santé mentale en consultation externe (71,4 %), des services psychosociaux (50,0 %), des services de santé mentale en milieu hospitalier (35,7 %) et des services d'aumônerie (21,4 %).

### **Diagnostiques de santé mentale parmi ceux morts par suicide en 2015**

Troubles mentaux connus au moment du décès, par exemple : troubles dépressifs (42,9 %), traumatismes et troubles du stress (35,7 %) et troubles d'anxiété (28,6 %). De plus, 42,9 % des cas avaient un trouble connu d'utilisation de substance. Il était commun (64,3 %) de retrouver au moins deux facteurs liés à la santé mentale au moment du décès.

### **Facteurs de stress de la vie et au travail parmi ceux morts par suicide en 2015**

Au moment du décès, au moins un des facteurs de stress de la vie et au travail était présent dans 92,9 % des cas de suicide chez les hommes de la Force régulière en 2015 (y compris : déclin des relations, suicide d'un ami ou d'un membre de la famille, décès d'un ami ou d'un membre de la famille, maladie personnelle ou d'un membre de la famille, dettes, problèmes professionnels, problèmes juridiques). La moitié des cas présentait au moins trois de ces facteurs avant le décès.

### **Taux brut de suicide (1995 – 2015)**

En 2015, le taux brut de suicide chez les hommes de la Force régulière était 24,9 (13,6 et 41,8) pour 100 000. Ce taux était le plus élevé à data. Toutefois, les intervalles de confiance entre toutes les périodes de temps s'entrecoupaient, ce qui suggère qu'il n'y avait pas de différence statistiquement importante du taux brut dans le temps. Également, les résultats de la dernière période portent seulement sur une année (2015) et devraient donc être examinés plus en détail pour établir si ce motif persiste.

### **Comparaison entre le taux de suicide chez les hommes de la Force régulière des FAC et le taux des Canadiens en utilisant le rapport standardisé de mortalité (1995 – 2015)**

Tout comme les taux bruts, les intervalles de confiance pour les rapports standardisés de mortalité entre les périodes de cinq ans (trois ans pour 2010 à 2012) s'entrecoupent, ce qui suggère qu'il n'y a pas de changement statistiquement important quant aux rapports standardisés de mortalité dans le temps.

### **Répercussion des déploiements sur le taux de suicide chez les hommes de la Force régulière des FAC**

La comparaison des rapports standardisés de mortalité entre les cas avec un historique de déploiement et ceux sans historique de déploiement (1995 – 2012) n'a pas permis d'établir une différence statistiquement importante dans les taux de suicide entre ces groupes. L'utilisation de la normalisation directe pour la période de dix ans (2005 – 2014) a permis d'établir un ratio de taux de suicide important d'un point de vue statistique en faisant la comparaison entre les cas avec un historique de déploiement et ceux sans déploiement (1,48 [intervalle de confiance de 95 % et 0,98-2,22]). Il se pourrait donc que le risque de suicide soit plus grand chez les hommes de la Force régulière ayant déjà fait l'objet d'un déploiement que chez les autres. Toutefois, les résultats liés aux déploiements peuvent être faussés par d'autres variables inexplicables.



**Répercussion du commandement sur les taux de suicide chez les hommes de la Force régulière des FAC**

Au cours de la période allant de 2002 à 2015, le taux brut de suicide parmi les hommes de la Force régulière du commandement de l'Armée était beaucoup statistiquement plus élevé que le taux des autres commandements (33,32 [27,14 et 40,92] par rapport à 13,08 [10,17 et 16,81]). La comparaison entre les taux de suicide ajustés selon l'âge de l'Armée et des autres commandements était aussi importante (2,49 [1,81 et 3,42]). Ce résultat était étayé par un rapport standardisé de mortalité pour le commandement de l'Armée beaucoup plus élevé en 2007 – 2011 (1,73 [1,23-2,36]).





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## Report Introduction

Suicide is a tragedy and an important public health concern. Suicide prevention is a top priority for the Canadian Armed Forces (CAF). Monitoring and analysing suicide events of CAF members provides valuable information to guide and refine ongoing suicide prevention efforts.

Historically, reports on suicide produced by the Epidemiology cell of the Directorate of Force Health Protection have focused on the surveillance and epidemiology of suicide within the Canadian Armed Forces (CAF). Since 2015, the report has expanded its scope to describe the larger body of evidence related to suicide in the Canadian Armed Forces, and to describe its evolution over the last 21 years (Chapter 2).

The epidemiological report is supplemented with more in-depth information on the mechanisms and underlying risk factors that may have contributed to the Regular Force male suicides that took place in 2015 based on an assessment of the Medical Professional Technical Suicide Reviews (MPTSRs) (Chapter 1). Finally, this report also provides a more in-depth analysis of the variation of suicide rates by command (Chapter 3).

In 2015, a total of 14 Regular Force male, 1 Regular Force female, and 3 male Reservists suicides occurred. This report, as with previous ones, only analyses Regular Force males that died by suicide. The reasons are as follow:

- 1) Female suicide numbers are small (range between 0 and 2 events per year), which precludes the ability to conduct trend analyses. Reporting separately on their characteristics would contravene the privacy of the individuals involved (“identity” and “attribute” disclosure<sup>1</sup>). Aggregating female data with male data would circumvent these disclosure concerns; however, the differences in suicide risk factors, behaviours and mechanisms between sexes warrant gender-specific evaluation of suicide-related evidence [31], [32].
- 2) In addition to concerns regarding identity and attribute disclosure with Reserve Force data, there are also issues around data completeness. Reserve Force records may be incomplete for both suicide events and information on the size and characteristics of the Reserve Force, both of which are needed to calculate reliable suicide rates. There is a high turnover for Class A Reservists and suicides among this group may not be brought to the attention of Department of National Defence (DND). The true

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<sup>1</sup> Statistics Canada defines *identity disclosure* as: “identifying an individual from a table, typically from small cell showing 1 or 2 persons with a characteristic. If no other information is released it is not necessarily a confidentiality breach but the perception of a breach is there. This translates into a “small cell” problem, where, for the purpose of vital statistics, “small” is defined as frequencies representing fewer than 5 births, deaths or stillbirths.”

*Attribute disclosure* is defined as: “disclosing attributes of individuals, even if they are not specifically identified. For example, a table row where all units share the same attribute because they are found in a single column. This translates into “zero cell” and “full cell” problems. Not all zero cells are problematic. Full cells, which occur when only one cell in a row or column is nonzero, are more likely to be.”

Taken from: **Statistics Canada. Disclosure control strategy for Canadian Vital Statistics Birth and Death Databases. Ministry of Industry: Ottawa, 2016.**



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number at risk is also uncertain. Since data on suicide attempts are often incomplete, in keeping with other occupational health studies, this report only includes completed suicides. The data used for this analysis include only those who have died of suicide while active in the Regular Forces and do not include those who have died of suicide after leaving the military.

Because of these limitations, the evidence presented in this report applies only to Regular Force males. We do separately assess the MPTSRs for the Regular Force females and Reserve Force members who have died by suicide in order to improve our understanding of suicide within those groups and guide our suicide prevention efforts, while recognizing that this information may well be limited with respect to the Reserve Force.



## Chapter 1 – Results from the Medical Professional Technical Suicide Review, 2015

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### 1.1 Introduction

This chapter provides information on the methods of suicide, mental health and psycho-social factors that may have contributed to the 2015 suicides reported here. Prior to the 2014 annual report on suicide mortality, the findings reported here were part of the **Medical Professional Technical Suicide Review Report (MPTSR)** [22] produced annually by the Directorate of Mental Health at DND. MPTSRs are also conducted on Reservist suicides, provided that those that are reported to civilian authorities are brought to the attention of the CAF. While the original MPTSR reports focused on providing the evidence emanating from all completed investigations (both Regular and Reserve), the data presented here, in keeping with the rest of this report, focus on Regular Force males only.

### 1.2 Methods

The data presented here are collected during the MPTSR process, following a completed suicide. The MPTSR was one of the key recommendations from the 2009 CAF's Expert Panel on Suicide Prevention. These reviews do not replace Boards of Inquiry, but focus on health-related matters based on the latest scientific knowledge regarding suicide factors and prevention. The MPTSR process is valuable for a number of reasons. It acts as a rapid quality assurance mechanism to identify any deficiencies in the quality of care, it identifies opportunities to reinforce and enhance the CAF's suicide prevention program, and it provides more accurate and complete data which can be used for suicide surveillance. An MPTSR is ordered by the Deputy Surgeon General when a death is deemed a likely suicide, and it is conducted by a team consisting of a mental health professional and a General Duty Medical Officer (GDMO or MO). This team reviews all pertinent health records and conducts interviews with medical personnel, unit members, family members and other individuals who may be knowledgeable of the circumstances of the suicide in question. All of this information is collated in an effort to better understand the circumstances that led to the suicide.

### 1.3 Results and Interpretation

A rare but tragic event, suicide is an important public health issue in Canada and for the Canadian Armed Forces. As defined by Durkheim in "Suicide: A Study in Sociology," [5] suicide is the result of "complex interrelationships among a multiplicity of characteristics." [24] As the determinants of suicide are multi-factorial, multi-faceted interventions are required to reduce the risk of suicide.

In an effort to better understand the underlying risk factors and characteristics of the Regular Force males who took their own lives, the data taken from the policy-mandated Medical Professional Technical Suicide Reviews (MPTSR) are presented here. At time of publication, all of the MPTSR reports were complete for the 14 Regular Force male suicides that occurred in 2015. As discussed in the methods, while the MPTSR report



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has historically reported on all completed investigations (both Regular and Reserve Force, involving both men and women), only the Regular Force male data are represented here. The reasons for doing so are as follows:

- 1) Complete data on all Regular Force male suicides was collected for 2015. We are therefore confident that the findings reported here are comprehensive and representative, and can therefore be used to make evidence-based policy and practice decisions.
- 2) The same conclusions cannot be drawn for the Reservist data. Given the underlying issues of reporting of Reserve Force suicides to the CAF, we cannot be confident as to the complete ascertainment of Reservist suicides. To use what limited evidence has been amassed for evidence-based policy and practice would require some confidence that these very few reports were in some way representative of the suicide experience in all (reported and unreported) Reserve Force suicides; this assumption cannot be made. Furthermore, it is probable that those individuals whose suicides were brought to the CAF's attention were different in some systematic fashion from other Reserve Force suicides (e.g. history of deployment); however, in the absence of systematic identification of Reservist suicides, this remains a hypothesis.
- 3) As discussed in the report introduction, presenting Reserve as well as female Regular Force data is also not an option, given the statistically small number of events. Providing Reserve Force and female Regular Force case information would likely allow for the identification of individuals and would therefore contravene confidentiality rules.

### 1.3.1 Demographics

At the time of suicide, a little over half of the deceased were married (Table 1-1). Of those who were reportedly married, 5 (62.5%) resided with their spouse, while 3 (37.5%) were not cohabitating with their spouse due to relationship issues, but none were legally separated. Six (42.9%) of the individuals had minor children and half of them lived with their children at the time of their death.

**Table 1-1: Marital Status at Time of Death.**

<b>Marital Status</b>	<b>2015 (N (%))</b>
Never married	6 (42.8%)
Common-law	0
Married	8 (57.1%)
Legally separated or divorced	0

For half of the individuals, the highest level of education attained was high school and 3 (21.4%) of the decedents held a post-secondary education degree (Table 1-2).



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**Table 1-2: Highest Level of Education at Time of Death.**

<b>Level of Education</b>	<b>2015 (N (%))</b>
Some high school	0
High school graduate	7 (50.0%)
Some college/technical school	3 (21.4%)
College degree	1 (7.1%)
Some Bachelor's	1 (7.1%)
Bachelor's degree	2 (14.3%)
Master's degree or higher	0 (0.0%)

### 1.3.2 Suicide Event Information

Table 1-3 below provides a summary of method of suicide as identified by the MPTSR during the reported period. Firearms and hanging were the most common methods of suicide, as was reported in past MPTSR Reports [22], [6]. This is similar to the Canadian male population where hanging and firearms were also the two most common methods for males that died by suicides [7].

**Table 1-3: Methods of Suicide.**

<b>Method of Suicide</b>	<b>2015 (N (%))</b>
Firearm/gun (non-military issue)	5 (35.7%)
Hanging	3 (21.4%)
Asphyxiation <sup>a</sup>	2 (14.3%)
Jumping from a high place	2 (14.3%)
Drugs	1 (7.1%)
Sharp or blunt object	1 (7.1%)

<sup>a</sup> Includes various forms, such as carbon monoxide, drowning, helium-induced.

Of the suicides reported here, alcohol use at the time of the event was confirmed in 2 (14.3%) cases. A combination of drug and alcohol use was confirmed for 1 (7.1%) additional suicide and the use of drugs only was also established for 2 (14.3%) others. It was undetermined whether or not alcohol or drugs played a role in 4 suicides. This does not mean that alcohol and/or drug use at the time of death were categorically ruled out, rather, this means there was insufficient evidence to make a determination.



### 1.3.3 Access to Care

It was confirmed that all but 1 of the 14 individuals included in this review had accessed some sort of health care in the CAF in the year prior to their suicide (Table 1-4). Ten (71.4%) accessed at least one type of care in the 30 days prior to the event; this percentage increases to 85.7% when the timeframe of access to care is increased to three months. Eleven (78.6%) individuals had accessed at least two services in the year preceding their suicide.

**Table 1-4: Access to Care Prior to Suicide<sup>a</sup>.**

Service	N (%)	N (%) with Access Within 30 Days	N (%) with Access Within Past Year
Primary Care	13 (92.6%)	10 (76.9%)	13 (100%)
Outpatient Mental Health	10 (71.4%)	4 (40.0%)	8 (80.0%)
Psychosocial Services <sup>b</sup>	7 (50.0%)	0 (0.0%)	4 (57.1%)
Inpatient Mental Health	5 (35.7%)	1 (20.0%)	3 (60.0%)
Chaplain Services	3 (21.4%)	1 (33.3%)	2 (66.7%)

<sup>a</sup>Total does not equal 100% as 78.6% of individuals accessed more than one service.

<sup>b</sup>Includes care delivered by Social Workers, Mental Health Nurses and Addictions Counsellors.

Thirteen individuals (92.6%) accessed primary care; 76.9% of them did so within 30 days prior to their death. It should be noted that the care sought may not have been directly mental health-related. This suggests that the universal prevention dimension of the public health suicide prevention model (designed to reach an entire population in an effort to maximize health and minimize suicide risk by removing barriers to care and increasing access to help) is an integral part of the health care services provided by CAF. However, this is only one dimension of a larger, integrated CAF suicide prevention model that also includes selective and indicated prevention strategies (as defined by the World Health Organisation (WHO) [35]).

Five (35.7%) individuals were seen by a Base Addiction Counsellor in the year prior to their suicide; none within 30 days of their death. MPTSRs do not typically specify whether the Base Addictions Counsellor was seen through psychosocial services (e.g. initial screening and consultation around addiction) or through the outpatient mental health programs (e.g. assessment and treatment of dependence or problem usage).

The absence of accessing care within 30 days of the suicide does not systematically imply a barrier to access; other elements may be a factor. For example, it could also mean that the individual accessed this type of care in the (not recent) past and completed their treatment; that access was provided but that the patient delayed attending appointments; or that personal or logistical issues influenced access. This is also consistent with what is seen in the general population. In the 2012 Canadian Community Health Survey Mental Health cycle, when asked about barriers to receipt of mental health care, the most frequently mentioned barriers were related to personal circumstances (73%). In addition, 43.2% of those with mental health needs suggested that they “[prefer] to manage on [their] own” [25].



### 1.3.4 Mental Health Factors<sup>2</sup>

Almost half of the individuals (42.9%) had a documented depressive disorder, 5 individuals (35.7%) had a trauma and stress-related disorder (includes adjustment disorders, PTSD) and 4 (28.6%) had an anxiety disorder (Table 1-5). All three (21.4%) individuals with PTSD were diagnosed more than a year prior to their death. In addition, 6 individuals (42.9%) had a documented substance use disorder. In addition to mental health factors, three (21.4%) of the individuals had been diagnosed with a traumatic brain injury (N.B.: The etiology of the traumatic brain injuries was not identified in the MPTSR; they may or may not be combat-related): one in the year prior to his death and two over a year preceding their deaths. Overall, nine (64.3%) individuals had at least two mental health factors at the time of death. Whether or not these mental health factors were related to operational stress<sup>3</sup> was not captured by the MPTSR.

**Table 1-5: Mental Health Factors<sup>a</sup>.**

Factor	2015 (N (%))
Depressive disorders	6 (42.9%)
Trauma and stress-related disorders (post-traumatic stress disorder)	3 (21.4%)
Trauma and stress-related disorders (other)	2 (14.3%)
Anxiety disorders	4 (28.6%)
Substance use disorders	6 (42.9%)
Traumatic brain injury	3 (21.4%)
Personality disorders	2 (14.3%)

<sup>a</sup> Total does not equal 100% as 64.3% of individuals had more than 1 mental health factors.

Documented evidence of prior suicidal ideation and/or prior suicide attempts was noted for 9 (64.3%) individuals. It is plausible that the prevalence of suicidal ideation and/or attempts within these individuals was higher than reported here, either because suicidal ideation and/or prior attempts were denied by the patient or suicidal ideation was not present at the time of the last visit to a medical care facility.

### 1.3.5 Work and Life Stressors Prior to Suicide

The MPTSR forms collect a non-exhaustive list of possible work and life stressors that may have contributed to a person’s decision to take their own life. Table 1-6 below provides more detailed information on the prevalence of these factors within the 2015 Regular Force males who died from suicide.

<sup>2</sup> The categories of mental health factors have been updated to reflect changes in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), American Psychiatric Association, 2013.

<sup>3</sup> An Operational Stress Injury (OSI) is a non-medical term used to describe a psychological injury that may include anxiety, depression, PTSD, substance abuse etc. An OSI can develop following a traumatic event, combat, grief or loss, high stress situations or from operational fatigue.



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**Table 1-6: Prevalence of Documented Work and Life Stressors Prior to Suicide<sup>a</sup>.**

<b>Factor</b>	<b>2015 (N (%))</b>
Failed/failing spousal/intimate partner relationship	10 (71.4%)
Failed other relationship (e.g. family, friends)	2 (14.3%)
Completed spousal, family or friend suicide	5 (35.7%)
Family or friend death (other than suicide)	1 (7.1%)
Physical health problem	5 (35.7%)
Ill family member	3 (21.4%)
Debt	4 (28.6%)
Job, supervisor or work performance problem	8 (57.1%)
Legal problem(s)	4 (28.6%)

<sup>a</sup> Total does not equal 100% as 78.6% of individuals had more than 1 stressor.

Thirteen (92.9%) suicide deaths of Regular Force males in 2015 had at least one of the stressors listed in Table 1-6 (78.6%) of them had more than one stressor, and 7 individuals (50.0%) reportedly had at least three concomitant stressors prior to their death.

Three individuals (21.4%) had documented history of being physically, sexually, and/or emotionally abused during their lifetime, while 2 (14.3%) individuals had been the perpetrators of physical abuse and/or emotional abuse.

Within two years prior to their death, 4 of the individuals (28.6%) had experienced some sort of legal or disciplinary proceedings (e.g. police investigation, legal proceeding, Absent Without Leave (AWOL), incarceration). At the time of death, 5 (35.7%) were in the process of being released from the CAF (disciplinary, administrative or medical). Of these five, 2 had also experienced legal or disciplinary proceedings in the past 2 years.

### 1.4 Recommendations Resulting from 2015 MPTSR Process

At the time of writing this report, the 18 MPTSRs involving Regular and Reserve Force personnel were completed for the calendar year 2015. From these reviews a total of 36 recommendations were made. Based on the evidence collected, none of the MPTSRs reached the conclusion that any of the suicides were readily preventable; however recommendations were identified to further enhance the three pillars of the CAF suicide prevention program (excellence in health care; effective leadership; aware and engaged members). The main recommendation categories were around policy, education, and clinical care.

With respect to policy recommendations emanating from the 2015 MPTSRs, a number of these raised the issue of developing policies and internal procedures to improve communication between parties, especially during critical times where individuals are potentially at an increased risk of suicide. This included formalizing handover procedures for transfers of care (e.g. civilian hospitals, external providers, between clinicians), as well as clearer policies for communication between medical professionals and the chain of





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command, so that they are aware when members require increased support. Clearer Medical Employment Limitations (MELs) and screening recommendations were proposed as ways of remedying that particular issue. These recommendations are routinely forwarded to the parties responsible for the specific areas of improvement. Subsequent action on these recommendations is tracked jointly by Senior Staff Officer (SSO) Surg Gen and DMH; however, the specific parties to whom the recommendations are forwarded are accountable for actioning them. Regarding clearer screening recommendations, additional guidance in the form of Instructions to Users (IUs) will be provided to clinicians completing pre and post-deployment screenings and Outside Canada posting screenings in the direct entry forms being developed for the CF Health Information System (CFHIS).

Also of note, two recommendations were made for the creation of post-suicide and/or post-suicide attempt aftercare policies. These will be addressed in the clinical guidance manual and the Suicide Prevention Program being developed by the Directorate of Mental Health (DMH).

Regarding recommendations related to education, some topics identified were similar to those identified in the 2014 Report on Suicide Mortality in the Canadian Armed Forces, such as training in suicide prevention and illicit drugs. As noted in the 2014 Report, this training is already available for all CAF members through either Road to Mental Readiness (R2MR) [26] and/or Strengthening the Forces Health Promotion programs [27].

In addition to the topics identified previously, supplementary training and education was recommended for medical professionals about the impact of alcohol and illicit drug use on suicidal risk, as well as the use of sick leave with patients at risk of suicide. These recommendations were referred to the Medical Clinical Quality Assurance Committee and to Directorate of Medical Policy (D Med Pol) for their action.

Several recommendations related to clinical care were also made. Six of these related to issues with communication between health care providers or between health care providers and the chain of command. As noted in the section on policy recommendations, this has been forwarded to D Med Pol. Seven recommendations were made surrounding the treatment of substance use. A portion of these advocated for more rigorous testing in cases where individuals are being treated for Substance Use Disorder (SUD), and several suggested that specific clinical interventions should be developed for members who are being treated for SUD and also present with other suicidal risk factors. These recommendations have been referred to D Med Pol and DMH for their review, and some have already been actioned, including the standardization of screening by developing a list of evidence-based, best practice screening tools available in both official languages, for use by all clinicians involved in the care of CAF personnel.

A number of the other recommendations reinforced processes already in place. These included mental health awareness training for the chain of command (R2MR, Strengthening the Forces) and the inclusion of the family in the member's treatment plan.

All recommendations have been reviewed and actioned as appropriate by the CF Health Services Group Clinical Quality Assurance Committee or the Quality and Patient Safety Advisory Committee.



## **Chapter 2 – The Epidemiology of Suicide in the Canadian Armed Forces, 1995 – 2015**

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### **2.1 Introduction**

There has been concern expressed since the early 1990s about the apparent rate of suicide in the CAF and its possible relationship to deployment [1]. In response to these concerns, the CAF began an active suicide mortality surveillance program to determine the rate of suicide among CAF personnel overall in comparison to the Canadian General Population (CGP) as well as the rate of suicide in those personnel with a history of deployment compared to those without such a history.

Understanding suicide rates in the CAF requires careful comparison to general population rates and trends. Although DND keeps a current record of CAF suicides, comparisons with the CGP are dependent on the releases of Canadian mortality rates by Statistics Canada approximately 4 years after the end of their data collection. Currently CAF suicide data are available until the end of 2015; however, the most recent CGP available data are for 2012.

This chapter provides CAF suicide rates over time, comparisons to the CGP, and suicide analyses according to deployment history.

### **2.2 Methods**

The CAF uses intentionally redundant methods to ensure that all cases of suicide in Regular Force personnel are identified. Information on the number of suicides and demographic information was obtained from the Directorate of Casualty Support Management (DCSM) up to 2012. As of September 2012, the number of suicides was tracked and provided by the Directorate of Mental Health (DMH). DMH also cross-references their results with those collected by the Administrative Investigation Support Centre (AISC), which is part of the Directorate Special Examinations and Injuries (DSEI). Note that suicide death investigations often take several months; as a result the investigations into suicides in the previous year were not all complete at the time of the initial release of this report.

Information on deployment history and CAF population data (by age, sex and deployment history) originated from the Directorate of Human Resources Information Management (DHRIM). History of deployment was based on department IDs and deployment units from DHRIM. It should be noted that the number of personnel with a history of deployment occasionally changes from previous reports due to updating of DHRIM records.

Canadian suicide counts by age and sex were obtained from Statistics Canada. Data were available up to 2012 at the time of preparation of this report. Canadian suicide rates are derived from death certificate data collected by the provinces and territories and collated by Statistics Canada. Codes utilized for this report were ICD-9 E950-E959 (suicide and self-inflicted injury) in the Shelf Tables produced by Statistics Canada from 1995 to 1999. For 2000 to 2008 the number of suicide deaths was based on ICD-10 codes X60-84 and Y87.0 utilizing Canadian Socio-Economic Information Management System (CANSIM) Table 102-0540 from Statistics Canada, for 2009 to 2012 suicide deaths CANSIM Table 102-0551 was the source. Open verdict



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cases (ICD-9: E980-E989; ICD-10: Y30-Y34) are excluded by Statistics Canada, although they are routinely included in suicide statistics reported elsewhere (e.g. UK – both in civilian and military contexts). To ensure valid comparisons, the Statistics Canada exclusions were followed for these analyses. All CGP denominators were taken from Statistics Canada CANSIM Table 051-0001. Denominators, up to and including 2010, were final intercensal estimates, while 2011 and 2012 were based on final post-censal estimates. There is some evidence that death certificate data underestimate suicide rates, especially in jurisdictions where the Beakin test is applied [2]. However, the CDC estimates that the true rate is probably no more than 1.25 times the official rate (US Centers for Disease Control and Prevention National Center for Injury Prevention and Control estimate). Importantly, there is no evidence suggesting that military personnel or veterans are more likely to have under-ascertainment of suicide on death certificates relative to other Canadians.

Canadian rates for suicide in females are typically 1/3 to 1/5 of those for males. In conjunction with the low proportion of females in the CAF, it is not unusual to have very few or no suicide deaths of CAF females on an annual basis. Due to the very low number of suicides by females and instability of this data statistically, comparisons to the Canadian suicide rates were made with male rates alone. Crude CAF Regular Force male suicide rates were calculated from 1995 to 2015. Suicide rates prior to 1995 have not been calculated as the historical method of ascertainment of suicides within the CAF is not well defined.

To compare CAF Regular Force male rates with general Canadian male population rates, standardization by age using the indirect method was used to provide Standardized Mortality Ratios (SMRs) for suicide up to 2012. This method controls for the difference in age distribution between the CAF Regular Force male and general Canadian male populations. An SMR is the observed number of cases divided by the number of cases that would be expected in the population at risk based on the age and sex-specific rates of a standard population (the CGP in this case) expressed as a percentage. Therefore, an SMR less than 100% indicates that the population in question has a lower rate than the CGP, while an SMR greater than 100% indicates a higher rate.

The calculation of confidence intervals for population-based data is provided here for those who may want to generalize the results to other years. Confidence Intervals (CIs) were calculated for CAF Regular Force male suicide rates and SMRs directly using Poisson distribution 95% confidence limits using the exact method described by Breslow and Day [3]. In any case, CIs are valuable in illustrating the expected random variability that is possible when dealing with numbers of cases that are small in epidemiologic terms. SMR confidence intervals that include 100% are not statistically significant.

SMRs were calculated separately for those Regular Force males with and without a history of deployment. However, as a general rule, SMRs cannot be compared directly to each other as they are standardized to different population distributions.

To compare suicide risk among those Regular Force males with a history of deployment directly to those without, direct standardization was done using the total Regular Force male population of the CAF as the standard. Age-adjusted suicide rates for those Regular Force males with and without a history of deployment were compared using rate ratios. However, since age-specific rates for this population are extremely unstable (as they are based on small numbers and are therefore prone to variation), caution should be used when comparing directly standardized rates. Confidence intervals were calculated using the method described in the text by Rothman and Greenland [4].



## 2.3 Results and Interpretation

### 2.3.1 Crude CAF Regular Force Male Suicide Rates (1995 – 2015)

Table 2-1 shows the CAF rate for suicide per 100,000 for Regular Force males. As the number of events was less than 20 in most years, rates were not calculated annually as these would not have been statistically reliable. Therefore five-year rates have been calculated for 1995 to 1999, 2000 to 2004, 2005 to 2009, and 2010 to 2014; a one-year rate was also calculated for 2015 only. Regular Force female rates were not calculated because female suicides were uncommon; there were no suicides in females from 1995 to 2002, two in 2003, no suicides in females in 2004 and 2005, one per year from 2006 to 2008, two in 2009, none in 2010, one in 2011, three in 2012, one in 2013, one in 2014, and one in 2015.

**Table 2-1: CAF Regular Force Male Multiyear Suicide Rates (1995 – 2015)<sup>a</sup>.**

<b>Year</b>	<b>Number of CAF Regular Force Male Person-Years<sup>4</sup></b>	<b>Number of CAF Regular Force Male Suicides</b>	<b>CAF Regular Force Male Suicide Rate per 10<sup>5</sup> (95% CI)</b>
1995	62 255	12	
1996	57 323	8	
1997	54 982	13	
1998	54 284	13	
1999	52 689	10	
<b>1995 – 1999</b>	<b>281 533</b>	<b>56</b>	<b>19.9 (15.1, 26.0)</b>
2000	51 537	12	
2001	51 029	10	
2002	52 747	9	
2003	54 137	9	
2004	53 873	10	
<b>2000 – 2004</b>	<b>263 323</b>	<b>50</b>	<b>19.0 (14.1, 25.1)</b>
2005	53 648	10	
2006	54 301	7	
2007	55 140	9	
2008	55 704	13	
2009	56 813	12	
<b>2005 – 2009</b>	<b>275 606</b>	<b>51</b>	<b>18.5 (13.8, 24.4)</b>
2010	58 723	12	

<sup>4</sup> Person time is defined as “a measurement combining person and time as the denominator in incidence and mortality rates when, for varying periods, individual subjects are at risk of developing disease or dying. It is the sum of the periods of time at risk for each of the subjects. **The most widely used measure is person-years,**” (emphasis added) (*A Dictionary of Epidemiology*. M Porta, Greenland S, Last JM, eds. Fifth Edition. New York (USA): Oxford UP, 2008).



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Year	Number of CAF Regular Force Male Person-Years <sup>4</sup>	Number of CAF Regular Force Male Suicides	CAF Regular Force Male Suicide Rate per 10 <sup>5</sup> (95% CI)
2011	58 622	21	
2012	57 940	10	
2013	57 687	9	
2014	56 699	16	
<b>2010 – 2014</b>	<b>289 866</b>	<b>68</b>	<b>23.5 (18.4, 29.9)</b>
<b>2015</b>	<b>56 284</b>	<b>14</b>	<b>24.9 (13.6, 41.8)</b>

<sup>a</sup> The number of confirmed suicides for CAF Regular Force males for 2009 increased by one since the “Suicide in the Canadian Forces 1995 to 2012” report.

As can be seen in Table 2-1, CAF Regular Force male suicide rates have not appreciably changed between 1995 and 2009. While they appear to have increased somewhat in the last five years, the confidence intervals for all time periods, including 2010 to 2014, overlap, indicating that this increase is not statistically significant. This increase is largely due to the number of suicides being atypically high in 2011. The 2015 rate appeared to be slightly higher than in 2010 – 2014; however, given the short time frame and very wide 95% confidence intervals, further monitoring of the data is required to monitor this pattern. Note that PYs refers to person-years.

### 2.3.2 Comparison of CAF Regular Force Male Suicide Rates to Canadian Rates Using Standardized Mortality Ratios (1995 – 2012)

As the CAF Regular Force male rates are statistically unstable due to low numbers, the best approach is to compare suicide mortality by estimating the number of cases expected assuming Canadian rates applied to the military population. This method, known as indirect standardization, is used commonly in occupational studies. By dividing the number of observed Regular Force male cases by those expected (using Canadian rates), the Standardized Mortality Ratio (SMR) can be calculated. This does limit calculations to include only those up to 2012 as Statistics Canada has only released suicide rates up to that year at present. Five-year and ten-year comparisons were calculated where possible as ten-year rates have narrower confidence intervals (Table 2-2).



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Table 2-2: Comparison of CAF Regular Force Male Suicide Rates to Canadian Male Rates Using Standardized Mortality Ratios (SMRs): 1995 – 2012<sup>a</sup>.

Year	Age	Number of CAF Regular Force Male Person-Years (PYs)	Canadian Male Suicide Rate	Expected # of CAF Regular Force Male Suicides	Observed # of CAF Regular Force Male Suicides	SMR for Suicide (95% Confidence Intervals)
<b>1995 – 1999 (5 Yr)</b>	15 – 19	4 056	19.36	0.79	2	
	20 – 24	26 521	26.81	7.11	7	
	25 – 29	52 268	25.28	13.22	14	
	30 – 34	72 904	27.61	20.13	17	
	35 – 39	64 964	29.40	19.10	10	
	40 – 44	33 881	29.44	9.97	3	
	45 – 49	18 769	28.12	5.28	3	
	50 – 54	7 766	26.83	2.08	0	
	55 – 59	404	23.92	0.10	0	
	<b>Total</b>			<b>77.77</b>	<b>56</b>	<b>72% (55, 94)<sup>†</sup></b>
<b>2000 – 2004 (5 Yr)</b>	15 – 19	5 875	14.87	0.87	1	
	20 – 24	28 433	21.70	6.17	6	
	25 – 29	36 274	20.56	7.46	9	
	30 – 34	48 996	22.48	11.01	8	
	35 – 39	65 618	25.34	16.63	10	
	40 – 44	47 569	26.08	12.41	10	
	45 – 49	20 602	26.77	5.51	5	
	50 – 54	9 256	26.20	2.42	1	
	55 – 59	700	23.05	0.16	0	
	<b>Total</b>			<b>62.65</b>	<b>50</b>	<b>80% (59, 105)</b>
<b>2005 – 2009 (5 Yr)</b>	15 – 19	7 412	11.84	0.88	0	
	20 – 24	39 045	18.82	7.35	10	
	25 – 29	45 551	17.61	8.02	7	
	30 – 34	41 004	18.58	7.62	6	
	35 – 39	47 669	22.29	10.63	11	
	40 – 44	50 000	25.51	12.75	13	
	45 – 49	31 281	26.58	8.31	3	
	50 – 54	11 897	25.27	3.01	1	
	55 – 59	1 747	23.23	0.41	0	
	<b>Total</b>			<b>58.97</b>	<b>51</b>	<b>87% (64, 114)</b>



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Year	Age	Number of CAF Regular Force Male Person-Years (PYs)	Canadian Male Suicide Rate	Expected # of CAF Regular Force Male Suicides	Observed # of CAF Regular Force Male Suicides	SMR for Suicide (95% Confidence Intervals)
<b>2010 – 2012 (3 Yr)</b>	15 – 19	3 401	12.99	0.44	0	
	20 – 24	28 123	18.65	5.24	9	
	25 – 29	33 665	17.01	5.73	8	
	30 – 34	28 462	18.07	5.14	10	
	35 – 39	24 085	20.67	4.98	6	
	40 – 44	23 756	23.20	5.51	5	
	45 – 49	21 572	25.71	5.55	4	
	50 – 54	10 365	25.46	2.64	1	
	55 – 59	2051	24.75	0.51	0	
	<b>Total</b>			<b>35.74</b>	<b>43</b>	<b>120% (87, 162)</b>

<sup>a</sup> Some estimates may have changed slightly compared to previous reports due to updated CGP and CAF Regular Force Male population and suicide numbers.

<sup>†</sup> Statistically significant.

A ten-year SMR was also calculated as the increased numbers provided more power to detect a difference from the Canadian rates. Further aggregation was not attempted as this would have aggregated the period of time prior to heavy combat years in Afghanistan with heavy combat years, thus not helping to clarify the picture. For the ten-year period from 1995 to 2004, the SMR was 76%, indicating that the number of suicides by CAF Regular Force males was 24% lower than that expected based on Canadian male rates taking the different age distributions into account. This finding was statistically significant as the upper confidence limit was less than 100%.

The 2005 to 2009 data (Table 2-2) indicate that the CAF Regular Force male population had a 14% lower suicide rate than the CGP after adjusting for the age differences between the populations. This SMR is not statistically significant as the confidence intervals include 100%. While the SMR for 2010 – 2012 is above 100%, the confidence intervals include 100%, making these results statistically non-significant. Finally, all SMR period confidence intervals overlap, suggesting that there is no statistically significant difference between the different 5-year SMRs. Particular caution should be taken with the interpretation of the 2010 – 2012 SMR, for a number of reasons:

- 1) The 2010 – 2012 SMR is based on only three years of data, with 2011 reporting an atypically high number of suicides;
- 2) This SMRs confidence intervals are very wide, suggesting that this SMR is not stable; and
- 3) This SMRs confidence intervals overlap with the previous 5-year SMR, which indicates that any change is not statistically significant.





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### 2.3.3 Comparison of CAF Regular Force Male Suicide Rates by Deployment History to Canadian Rates Using Standardized Mortality Ratios (1995 – 2012)

Concern has been expressed that CAF Regular Force males with a history of ever being deployed may be more likely to die of suicide, in spite of prior analyses not showing such an effect. The SMRs according to a history of deployment are shown in Table 2-3.

**Table 2-3: Standardized Mortality Ratios for Suicide in the CAF Regular Force Male Population by History of Deployment: 1995 – 2012.**

Year	Age	CAF Regular Force Male Suicides With History of Deployment			CAF Regular Force Male Suicides Without History of Deployment		
		Expected	Observed	SMR (95% CI)	Expected	Observed	SMR (95% CI)
<b>1995 – 1999 (5 Yr)</b>	15 – 19	0.01	0		0.78	2	
	20 – 24	1.33	2		5.78	5	
	25 – 29	4.90	3		8.31	11	
	30 – 34	8.07	10		12.06	7	
	35 – 39	7.84	4		11.26	6	
	40 – 44	4.21	1		5.76	2	
	45 – 49	2.13	0		3.15	3	
	50 – 54	0.73	0		1.35	0	
	55 – 59	0.01	0		0.08	0	
<b>Total</b>				<b>68% (42, 105)</b>			<b>74% (52, 103)</b>
<b>2000 – 2004 (5 Yr)</b>	15 – 19	0.01	0		0.86	1	
	20 – 24	1.33	1		4.84	5	
	25 – 29	3.56	3		3.90	6	
	30 – 34	6.45	6		4.56	2	
	35 – 39	9.42	6		7.21	4	
	40 – 44	6.75	6		5.66	4	
	45 – 49	2.89	3		2.62	2	
	50 – 54	1.12	0		1.30	1	
	55 – 59	0.06	0		0.10	0	
<b>Total</b>				<b>79% (51, 117)</b>			<b>80% (52, 119)</b>
<b>2005 – 2009 (5 Yr)</b>	15 – 19	0.01	0		0.87	0	
	20 – 24	1.28	4		6.00	6	
	25 – 29	3.36	3		4.61	4	
	30 – 34	4.62	2		2.97	3	
	35 – 39	7.38	6		3.21	5	
	40 – 44	8.56	11		4.15	2	
	45 – 49	5.22	3		3.11	0	
	50 – 54	1.74	0		1.28	1	
	55 – 59	0.20	0		0.21	0	
<b>Total</b>				<b>90% (60, 129)</b>			<b>80% (49, 122)</b>





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Year	Age	CAF Regular Force Male Suicides With History of Deployment			CAF Regular Force Male Suicides Without History of Deployment		
		Expected	Observed	SMR (95% CI)	Expected	Observed	SMR (95% CI)
<b>2010 – 2012 (3 Yr)</b>	15 – 19	0.00	0		0.44	0	
	20 – 24	0.93	2		4.31	7	
	25 – 29	2.32	3		3.41	5	
	30 – 34	2.89	5		2.25	5	
	35 – 39	3.29	5		1.68	1	
	40 – 44	3.80	4		1.71	1	
	45 – 49	3.66	3		1.89	1	
	50 – 54	1.56	0		1.08	1	
	55 – 59	0.27	0		0.24	0	
	<b>Total</b>			<b>117.5% (73, 177)</b>			<b>123.5% (76, 189)</b>

The SMRs in each of the 5 year periods (prior to 2005) indicate that the observed number of CAF Regular Force male suicides is consistently less than that expected using general Canadian male suicide rates. For example, in the period from 1995 to 2004, the number of suicides among CAF Regular Force males with a history of deployment was 73% of that expected based on Canadian male suicide rates, meaning that male personnel who had ever deployed were 27% less likely to die of suicide compared to the CGP of males of the same age. This was also statistically significant as the confidence intervals did not include 100%. For CAF Regular Force males who did not deploy, the SMR was 78%, indicating that they were 22% less likely to die of suicide compared to the CGP of males of the same age; however this finding was not statistically significant. Similar patterns were noted in the 10-year rate, where the SMR for those with a history of deployment was 73% (95% CI: 54% – 98%) compared to 78% (95% CI: 56% – 101%) in those without a history of deployment (not presented in Table 2-3).

From 2005 to 2009, CAF Regular Force males who had a history of deployment were 10% less likely to die from suicide than Canadian males of the same age; however, this result was not statistically significant.

Although the figures for the three-year time period from 2010 to 2012 are shown for completeness, the confidence limits are very wide and the findings were not statistically significant. Consequently, while the SMRs appear to be substantially higher for both the deployed and non-deployed during 2010 – 2012 compared to previous years, it is unclear whether this apparent elevation in suicide ratios in both the deployed and non-deployed population was due to an emerging trend or simply to random variation in the number of events from year to year.

### 2.3.4 CAF Regular Force Male Suicide Rates by Deployment History Using Direct Standardization (1995 – 2015)

Table 2-4 (5-year) and Table 2-5 (10-year) show the results of the direct standardization analyses. Suicide rate ratios less than 1.0 suggest a decreased risk of suicide with a history of deployment; rate ratios greater than 1.0 suggest an increased risk with a history of deployment.



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Table 2-4: Comparison of CAF Regular Force Male 5-Year Suicide Rates by Deployment History Using Direct Standardization (1995 – 2015)<sup>a</sup>.

Year	Age	Number of CAF Regular Force Male Person-Years	CAF Regular Force Male Suicide Rate/10 <sup>5</sup>		Age-Adjusted Suicide Rate/10 <sup>5</sup>		Suicide Rate Ratio (95% CI)
			<i>History of Deployment?</i>		<i>History of Deployment?</i>		
			<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	
<b>1995 – 1999 (5 Yr)</b>	15 – 19	4 056	0.00	49.83			
	20 – 24	26 521	40.23	23.20			
	25 – 29	52 268	15.47	33.47			
	30 – 34	72 904	34.23	16.02			
	35 – 39	64 964	15.00	15.67			
	40 – 44	33 881	6.98	10.22			
	45 – 49	18 769	0.00	26.78			
	50 – 54	7 766	0.00	0.00			
	55 – 59	404	0.00	0.00			
	<b>Total</b>	<b>281 533</b>	<b>19.05</b>	<b>20.39</b>	<b>19.83</b>	<b>19.90</b>	<b>1.00 (0.57, 1.75)</b>
<b>2000 – 2004 (5 Yr)</b>	15 – 19	5 875	0.00	17.26			
	20 – 24	28 433	16.29	22.43			
	25 – 29	36 274	17.34	31.62			
	30 – 34	48 996	20.91	9.85			
	35 – 39	65 618	16.14	14.06			
	40 – 44	47 569	23.19	18.43			
	45 – 49	20 602	27.77	20.41			
	50 – 54	9 256	0.00	20.10			
	55 – 59	700	0.00	0.00			
	<b>Total</b>	<b>263 323</b>	<b>19.14</b>	<b>18.84</b>	<b>18.42</b>	<b>18.13</b>	<b>1.02 (0.57, 1.80)</b>
<b>2005 – 2009 (5 Yr)</b>	15 – 19	7 413	0.00	0.00			
	20 – 24	39 044	58.09	18.66			
	25 – 29	45 557	15.61	15.19			
	30 – 34	41 004	12.00	18.74			
	35 – 39	47 665	18.06	34.63			
	40 – 44	50 003	32.66	12.25			
	45 – 49	31 279	15.29	0.00			
	50 – 54	11 899	0.00	19.87			
	55 – 59	1 749	0.00	0.00			
	<b>Total</b>	<b>275 613</b>	<b>20.63</b>	<b>16.13</b>	<b>22.38</b>	<b>17.01</b>	<b>1.37 (0.74, 2.57)</b>



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Year	Age	Number of CAF Regular Force Male Person-Years	CAF Regular Force Male Suicide Rate/10 <sup>5</sup>		Age-Adjusted Suicide Rate/10 <sup>5</sup>		Suicide Rate Ratio (95% CI)
			<i>History of Deployment?</i>		<i>History of Deployment?</i>		
			<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	
<b>2010 – 2014 (5 Yr)</b>	15 – 19	5 121	0.00	0.00			
	20 – 24	42 790	31.96	30.11			
	25 – 29	55 679	28.44	23.13			
	30 – 34	48 534	40.66	23.27			
	35 – 39	40 462	25.19	7.89			
	40 – 44	38 312	24.64	10.09			
	45 – 49	33 980	20.55	10.36			
	50 – 54	19 001	16.10	15.21			
	55 – 59	3 919	0.00	0.00			
	<b>Total</b>	<b>287 798</b>	<b>26.72</b>	<b>20.27</b>	<b>27.42</b>	<b>17.56</b>	<b>1.56 (0.91, 2.66)</b>
<b>2015 (1 Yr)</b>	15 – 19	1 201	0.00	0.00			
	20 – 24	6 984	0.00	14.59			
	25 – 29	11 115	0.00	11.42			
	30 – 34	10 569	20.87	34.62			
	35 – 39	8 385	57.65	0.00			
	40 – 44	6 651	84.62	51.98			
	45 – 49	5 778	23.74	0.00			
	50 – 54	4 564	0.00	0.00			
	55 – 59	1 117	0.00	0.00			
	<b>Total</b>	<b>56 364</b>	<b>35.61</b>	<b>16.08</b>	<b>24.91</b>	<b>16.68</b>	<b>1.49 (0.42, 5.26)</b>

<sup>a</sup> Some estimates may have changed slightly compared to previous reports due to updates in CAF Regular Force male population numbers.



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Table 2-5: Comparison of CAF Regular Force Male 10-Year Suicide Rates by Deployment History Using Direct Standardization (1995 – 2014)<sup>a,b</sup>.

Year	Age	Number of CAF Regular Force Male Person-Years	CAF Regular Force Male Suicide Rate/10 <sup>5</sup>		Age-Adjusted Suicide Rate/10 <sup>5</sup>		Suicide Rate Ratio (95% CI)
			<i>History of Deployment?</i>		<i>History of Deployment?</i>		
			<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	
<b>1995 – 2004 (10 Yr)</b>	15 – 19	9 931	0.00	30.58			
	20 – 24	54 954	27.01	22.81			
	25 – 29	88 542	16.35	32.79			
	30 – 34	121 900	27.63	14.07			
	35 – 39	130 582	15.66	14.98			
	40 – 44	81 450	17.42	14.54			
	45 – 49	39 371	16.33	23.81			
	50 – 54	17 022	0.00	9.99			
	55 – 59	1 104	0.00	0.00			
	<b>Total</b>	<b>544 856</b>	<b>19.10</b>	<b>19.72</b>	<b>19.10</b>	<b>19.13</b>	<b>1.00 (0.67, 1.49)</b>
<b>2005 – 2014 (10 Yr)</b>	15 – 19	12 534	0.00	0.00			
	20 – 24	81 834	45.65	24.75			
	25 – 29	101 236	22.32	19.70			
	30 – 34	89 538	26.90	21.34			
	35 – 39	88 127	21.30	22.13			
	40 – 44	88 315	28.99	11.44			
	45 – 49	65 259	18.20	4.69			
	50 – 54	30 900	10.37	17.23			
	55 – 59	5 668	0.00	0.00			
	<b>Total</b>	<b>563 411</b>	<b>23.72</b>	<b>18.26</b>	<b>25.47</b>	<b>17.27</b>	<b>1.48 (0.98, 2.22)</b>

<sup>a</sup> Some estimates may have changed slightly compared to previous reports due to updates in CAF Regular Force male population numbers.

<sup>b</sup> Excludes 2015 results as these were presented in Table 2-4.

In the ten-year time period from 1995 to 2004, the standardized rate ratio suggests that having a history of deployment does not make one more or less likely to die from suicide compared to those who did not have a history of deployment. The suicide rate ratio of 1.00 indicates that the rate of suicide among those CAF Regular Force males with a history of deployment is the same as that found among those without a history of deployment. Data from 2005 to 2015 show that there was an increased rate ratio in suicide deaths among those Regular Force males with a history of deployment compared to those without a history of deployment. However, as with the other time periods, the confidence interval for this finding contains 1.00, signifying that the results were not statistically significant. Furthermore, the confidence intervals for these different estimates also overlapped, suggesting that there was no statistically significant difference between the 1995 – 2004 and the 2005 – 2014 suicide rate ratios.



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The one-year (2015) data are also provided, but for information only, as the confidence intervals for this estimate were very wide and overlapped with the confidence intervals for all other time periods presented in Table 2-4 and Table 2-5. However, it would appear that the risk profile in 2015 only was substantially different from previous years; whereas younger age groups (under 35 years) appeared to be at higher risk of suicide, both in those with and without histories of deployment, in 2015, the higher risks appeared to be in the older individuals (most especially in those 40 – 44 years). It is unclear at this early stage whether this finding is due to random fluctuation or whether it is indicative of a changing trend.

The data for 2010 – 2014 (5-year) and 2005 – 2014 (10-year) both show suicide rate ratios appreciably above 1.00 (1.56 and 1.48, respectively), and are approaching significance, especially the 2005 – 2014 rate (both have lower confidence intervals close to 1.00). These suggest that those Regular Force males with a history of deployment may be at increased risk of taking their own lives, compared to those with no history of deployment. However, the following points must be noted:

- 1) The statistical power of the study is limited;
- 2) As mentioned in the methods, the age-specific rates for this population are extremely unstable;
- 3) Deployment experiences vary widely in terms of location, length of time, and exposure to negative events; and
- 4) Deployment may be confounded by other unexplained variables.



## Chapter 3 – Selected Analyses on Regular Force Male Suicide in the Canadian Armed Forces, by Command, 2002 – 2015

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### 3.1 Introduction

In 2011 an increase in suicides in Regular Force males in the Canadian Armed Forces (CAF), combined with an increase reported by the US military [8], [9], raised concerns that Regular Force males within the Army command might have a higher rate of suicide than the Regular Force males within other commands. Preliminary analyses (of Regular Force males by command) completed in September 2011 suggested a higher suicide rate over a ten year period (2002 to 2011) in the Army command compared with the Air Force command and a third grouping comprised of the Navy, Support and Communications and Services command categories (henceforth referred to as “Other” command) [10]. A subsequent analysis [11] identified a statistically significantly higher crude suicide rate for Regular Force males in the Army command relative to other commands. However, no significant differences were identified between the suicide rates for the combat arms trades versus all other trades.

To further examine suicide trends in Regular Force males in the CAF, the following analyses were conducted for the time period of January 2002 to December 2015:

- 1) Calculation of crude rates for the Army versus the non-Army<sup>5</sup> commands and age-adjusted rates by these same groupings;
- 2) Standardized mortality ratios by command groups (Army, Air Force and combined Navy/Other);
- 3) Re-calculation of the suicide rate in the combat arms trades; and
- 4) The calculation of an age-standardized moving average suicide rate per 100,000 population, both for Army and non-Army commands.

This chapter provides a summary of the results, methods and limitations of these analyses. Each analysis has limitations which must be considered with the results; as such the limitations section is highlighted directly beneath the result section for each analysis.

### 3.2 Methods

#### 3.2.1 Suicide Data and Related Demographic Information (Numerator Data)

Information on the number of suicides per year in the CAF as well as specific information on the name, year of death, age, sex and unit of persons who died of suicide was obtained from the Directorate of Casualty Support Management (DCSM) until September 2012, after which data was provided by the Administrative Investigative Support Centre (AISC) of the Directorate Special Examinations and Inquiries (DSEI). Information on component, environment, Military Occupational Structure ID/Military Occupation code (MOSID/MOC), last known department description and last known location were obtained through a request to the Directorate of

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<sup>5</sup> Non-Army refers to all commands other than Army (i.e. Air Force, Navy, Support and Communications and Services).



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Human Resources Information Management (DHRIM) using Human Resources Management System (HRMS) data.

Command was ascertained in three fashions:

- 1) If command was explicitly stated in the Medical Professional Technical Suicide Review (MPTSR) Report [6] or in the Suicide Event Report for an individual (2011 – 2015 cases), the command information provided by the MPTSR was used.
- 2) However, if information as to which CAF command an individual belonged was not available in the MPTSR or the DCSM/AISC database, individuals were assigned into Army or Non-Army command categories based on their home unit information.
- 3) In some cases, MOC/MOSID and rank were also used to classify individuals if the home unit information was not clear. This subjective method may have led to misclassification of some suicides into an incorrect command, affecting the validity of the results.

MOSID information for the analysis involving the “Army trade” (or “combat arms”) was obtained directly from DHRIM. Individuals were considered to be employed in an Army trade if they had the following MOSIDs: 00005 (CRMN), 00008 (ARTYMN-FD), 00009 (ARTYMN-AD), 00010 (INFMN), 000178 (ARMD), 000179 (ARTY), 000180 (INF), 000181 (ENGR), 00339 (CBT ENGR) and 00368 (ARTYMN) (since 2012).<sup>6</sup>

### 3.2.2 Number of CAF Regular Force Males at Risk (Denominator Data)

The number of CAF Regular Force males by command and Army MOSIDs for each year (denominators) were provided by DHRIM.

### 3.2.3 Analysis

Data are presented as raw numbers of Regular Force male suicides and crude rates (per 100,000) over the last fourteen years (from January 2002 to December 2015), which were also the years that the Canadian Armed Forces (CAF) was deployed to Afghanistan. Rates were calculated by dividing the number of suicides by Regular Force males by the total number of person-years of time accumulated. In addition, age-adjusted rates and rate ratios were calculated using direct standardization for the command analyses. This was done in order to adjust for the potentially different age structures between the groups (i.e. to control for potential confounding by age). The rates for each command were age-standardized using the total CAF Male Regular Force population as the standard population. 95% confidence intervals were calculated using the Poisson distribution 95% confidence limits.

In an effort to continue producing a high quality report that depicts a complete and accurate picture of suicide surveillance in the CAF, a number of changes were made to the analysis framework and related presentation of findings in this year’s report, relative to previous years. The changes and their rationales are outlined below:

- 1) The stratification of Standardized Mortality Ratios (SMRs) was changed. Whereas previous reports presented one SMR for the full time period, the SMRs have now been broken down (when possible) into 5-year increments, both for the sake of continuity with the rest of the report, but also to better present temporal changes (if any) in rates within each specific command.

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<sup>6</sup> Details on the different MOSIDs, including the general duties associated with them, are available at: <http://www.forces.gc.ca/en/about-policies-standards-medical-occupations/cf-mosid-task-statements.page>.



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- 2) Air Force was removed from the “non-Army” category and is now presented separately, so as to ensure that any differences between Air Force and Navy (should any emerge) could be identified. Navy remains aggregated with Support, Communications and Services due to small population and suicide numbers (“Navy/Other”).
- 3) 2012 SMR data are now available; however, due to the small number of cases, age-specific data are not presented, so as to protect the identity of cases. However, the total SMRs are based on the same methodology as the 2002 – 2006 and 2007 – 2011 SMRs; only the total values are presented here.
- 4) In previous years, 10 cases (7 Army, 2 Air Force and 1 Navy) were classified as part of the Support, Communications and Services (“Other”) category. With the use of more up to date data extracted from the DND pay system, these cases were reclassified into specific commands. This reclassification has ramifications primarily for the analyses where command was dichotomised as Army/non-Army, as 7 cases were removed from the non-Army group and placed into the Army group. The reclassification will therefore result in increases in the Army SMRs reported here, compared to the results from previous years. This reclassification also has implications for the crude rates, and standardized rate ratio analyses presented in this report, as the ratio of Army to non-Army suicides has shifted compared to previous years.

Whenever possible, the implications of these changes will be outlined in the results and discussion of the findings. In particular, findings pertaining to the Army/Non-Army rates will include sensitivity analyses that highlight the extent of the impact of the reclassification on reported rates, relative to previous years.

### 3.3 Results

#### 3.3.1 Suicide in Regular Force Males in the CAF by Army vs. Non-Army Command, 2002 to 2015

Table 3-1 describes the number of deaths by suicide of CAF Regular Force males by year in each command grouping (Army and Non-Army) as well as the crude suicide rate per 100,000 population for each of the aforementioned groupings. Over the past 14 years, there were 96 deaths by suicide among the Regular Force males within the Army command and 65 within all other commands combined (Navy, Air Force and Other). The confidence intervals for the rate in each command did not overlap indicating that there was a statistically significant difference in the crude Regular Force male suicide rates between the Army and Non-Army commands.





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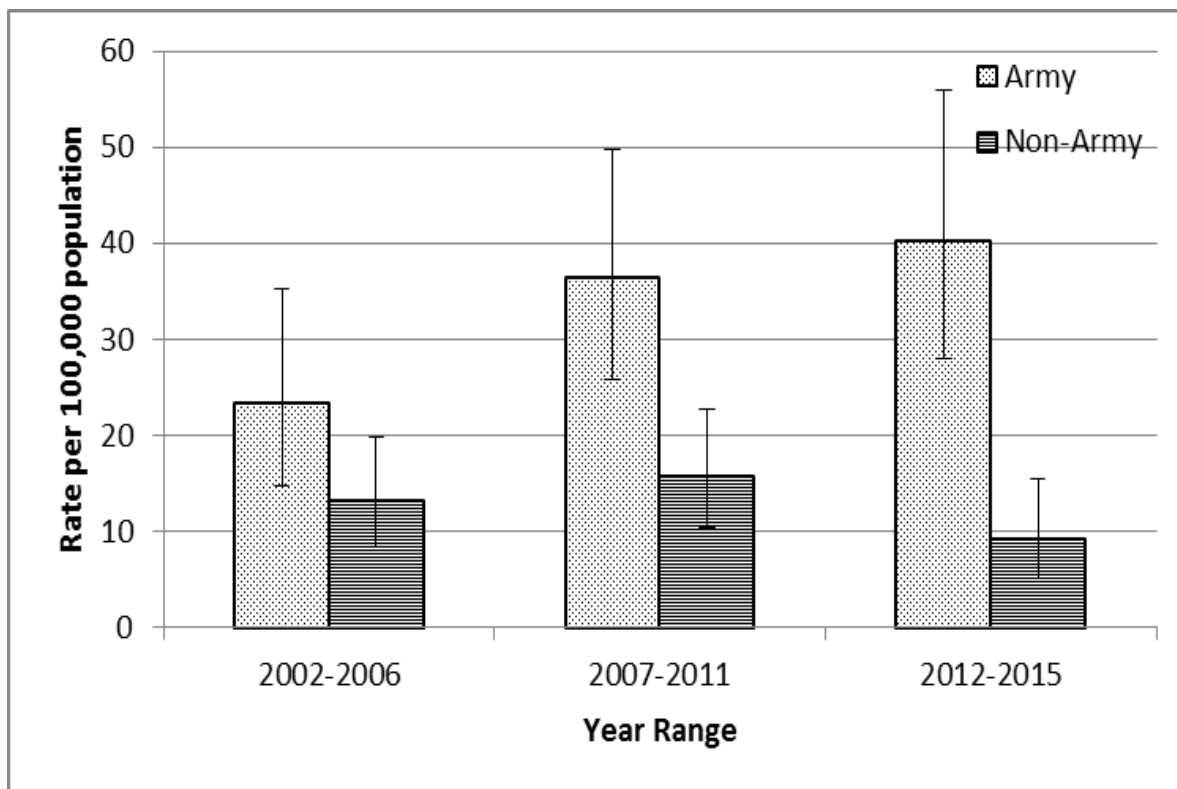
**Table 3-1: CAF Regular Force Male Crude Suicide Rates  
by Army vs. Non-Army Command, 2002 to 2015.**

Year	Number of CAF Regular Force Males by Command		Number of CAF Regular Force Male Suicides by Command		CAF Regular Force Male Suicide Rate by Command per 10 <sup>5</sup> (95% CI)	
	Army	Non-Army	Army	Non-Army	Army	Non-Army
2002	18 379	34 607	6	3**	33.32 (27.14, 40.92)	13.08 (10.17, 16.81)
2003	18 953	35 076	3	6		
2004	19 098	34 642	5	5		
2005	18 859	34 632	5	5		
2006	18 863	35 329	3	4		
2007	19 497	35 410	4**	5**		
2008	19 829	35 951	7**	6**		
2009	21 503	35 595	6	6		
2010	23 547	35 605	7**	5**		
2011	22 665	36 062	15	6		
2012	22 066	35 874*	8	2		
2013	21 325	36 362	9	0		
2014	20 911	35 788	9	7		
<b>2015</b>	<b>20 513</b>	<b>35 771</b>	<b>9</b>	<b>5</b>		
<b>2002 – 2015</b>	<b>286 008</b>	<b>496 704*</b>	<b>96**</b>	<b>65**</b>		

\* The number of personnel in 2012 was updated as per HRMS data, which impacts the 2002 – 2012 total number.

\*\* The numbers reported here have changed due to a reclassification of command as a result of access to better data.

During the 14 year period depicted in Table 3-1, the Army command crude suicide rate among Regular Force males was nearly 2.6 times that of non-Army command Regular Force males. Over this time period, the confidence intervals for the two estimates did not overlap, indicating that the suicide rate was significantly different between Army and non-Army. For comparison, Figure 3-1 shows the five year crude rates for the 2002 – 2006, 2007 – 2011 and 2012 – 2015 time periods. When broken down into multi-year time periods (Figure 3-1 below), the crude rate ratio between Army and non-Army command Regular Force males increased from 1.77 during the 2002 – 2006 period to 4.14 for the 2012 – 2015. This was the result of two separate trends: an increase over time in the crude Army rate combined with a decrease in the crude non-Army rate over the same time period. While there was no statistically significant difference in the crude suicide rates between Army and Non-Army commands during the 2002 – 2006 period, the confidence intervals for the two groups in both 2007 – 2011 and 2012 – 2015 did not overlap; this indicates a statistically significant difference in the crude suicide rates for these two command groupings.



**Figure 3-1: Multi-Year Crude Suicide Rates by Command, 2005 – 2006, 2007 – 2011, and 2012 – 2015, Regular Force Males Only.**

A key limitation of this analysis is that the crude rate does not adjust for other potential conditions or circumstances (including changes in population makeup and confounders). As was outlined in the main report, the statistical probability of a military member taking his/her own life is influenced by a number of inter-related social factors; crude rates do not take these into consideration. It can, however, highlight the imbalances in the burden of suicide in the CAF, with a disproportionately large part of the burden being placed on the Army command.

Table 3-2 below provides the age-adjusted Regular Force male suicide rates and the suicide rate ratios comparing Army and Non-Army command. The rate ratio was 2.49, meaning that the age-adjusted suicide rate among Regular Force males in the Army was approximately 2.5 times greater than that in the non-Army commands; this finding was significantly different, which was not the case in previous years. These findings may be partially explained by two factors:

- 1) This current analysis included the period 2013, where all (n = 9) suicides by Regular Force males were attributed to the Army command, thereby substantially changing the ratio of Army to combined AF, Navy and Other (“Non-Army”) command suicides; and
- 2) This increase in the suicide rate ratio between 2014 and 2015 is driven in large part by the reclassification of 7 “other” cases into the Army category.



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**Table 3-2: Age-adjusted Suicide Rates for Regular Force  
Males by Army vs. Non-Army Command, 2002 – 2015.**

Age Group	Crude Suicide Rate per 100,000		Age-Adjusted Suicide Rate per 100,000		Suicide Rate Ratio (95% CI)
	Army	Non-Army	Army	Non-Army	
15 – 19	0	0			
20 – 24	40.31	13.23			
25 – 44	32.16	15.09			
45 – 64	36.30	8.63			
<b>Total</b>	<b>33.32</b>	<b>13.08</b>	<b>33.57</b>	<b>13.14</b>	<b>2.49 (1.81, 3.42)<sup>†</sup></b>

<sup>†</sup> Statistically significant.

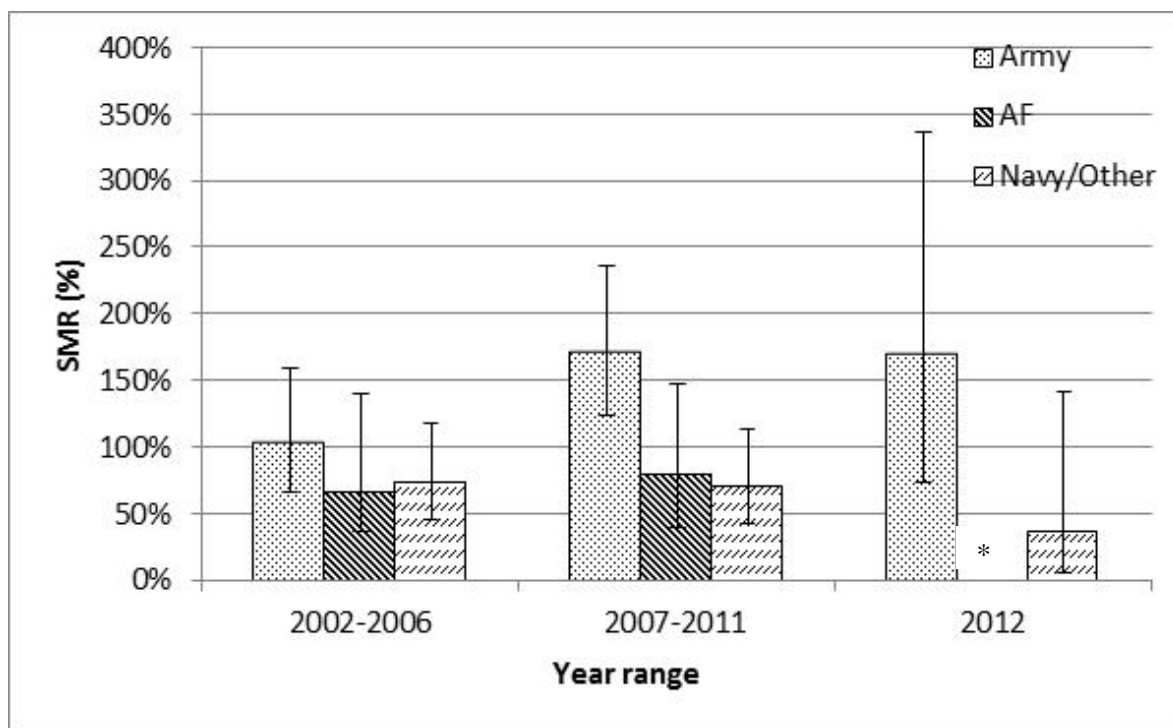
A sensitivity analysis to quantify the effect of this reclassification found that the suicide rate ratio, had the 7 cases not been reclassified, would have been 2.07, which is substantially closer to the 2002 – 2014 suicide rate ratio of 2.02. This indicates that the increase in the rate ratio was only minimally due to an increase in the proportion of Army to non-Army cases between 2014 and 2015.

### 3.3.2 Comparison of CAF Regular Force Male Suicide Rates Using Standardized Mortality Ratios (SMRs): 2002 – 2012, Stratified by Command

Table 3-3 to Table 3-5 below illustrate the standardized mortality ratios for all commands grouped together, as well as stratified by Army, Air Force and Other (Navy, Support, Communications and Services) commands. Unlike in previous years, the SMRs have now been broken down (when possible) into 5-year increments, both for the sake of continuity with the rest of the report, but also to better present temporal changes (if any) in rates within each specific command. These results are also presented graphically in Figure 3-2.



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\* There were no Regular Force Air Force male suicides in 2012.

**Figure 3-2: Comparison of Suicide SMRs by Command, Regular Force Males Only, 2002 – 2006, 2007 – 2011 and 2012.**

Table 3-3 presents the 5-year SMRs for the early Afghanistan years (2002 – 2006). While the Army SMR was above 100%, whereas the Air Force and Navy/Other SMRs were below 100%, all of the SMRs overlap 100%, suggesting that there was no significant difference in the suicide rates between these three commands. This was also the case in the “All-command” SMR. As a sensitivity analysis, Air Force and Navy/Other were collapsed into one group; combining these two command groups did not result in a statistically significant finding.

**Table 3-3: Standardized Mortality Ratios for Suicide in CAF Regular Force Males by Command, 2002 – 2006.**

Command	Age	Number of CF Personnel (PYs)	Canadian Male Suicide Rate (per 100,000)	Expected # of Male CAF Suicides	Observed # of Male CAF Suicides	SMR for Suicide (95% Confidence Intervals)
Army	15 – 19	1 576	13.37	0.21	0	
	20 – 24	15 454	20.22	3.12	6	
	25 – 29	18 370	18.61	3.42	4	
	30 – 34	17 776	20.64	3.67	3	
	35 – 39	18 772	24.40	4.59	2	
	40 – 44	14 529	25.00	3.63	2	



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Command	Age	Number of CF Personnel (PYs)	Canadian Male Suicide Rate (per 100,000)	Expected # of Male CAF Suicides	Observed # of Male CAF Suicides	SMR for Suicide (95% Confidence Intervals)
Army (cont'd)	45 – 49	5 773	26.98	1.56	4	
	50 – 54	1 732	25.43	0.44	1	
	55 – 59	170	23.36	0.04	0	
	<b>Total</b>			<b>20.88</b>	<b>22</b>	<b>105% (66, 159)</b>
Air Force	15 – 19	352	13.37	0.05	0	
	20 – 24	4 149	20.22	0.85	2	
	25 – 29	6 642	18.61	1.28	1	
	30 – 34	8 858	20.64	1.97	0	
	35 – 39	14 608	24.40	3.84	3	
	40 – 44	15 707	25.00	4.29	2	
	45 – 49	6 647	26.98	2.04	1	
	50 – 54	2 154	25.43	0.66	1	
	55 – 59	203	23.36	0.07	0	
<b>Total</b>			<b>14.27</b>	<b>10</b>	<b>68% (33, 125)</b>	
Navy/Other	15 – 19	4 267	13.37	0.57	0	
	20 – 24	13 243	20.22	2.67	2	
	25 – 29	13 564	18.61	2.48	3	
	30 – 34	17 122	20.64	3.39	2	
	35 – 39	23 051	24.40	5.34	2	
	40 – 44	23 538	25.00	5.52	3	
	45 – 49	12 687	26.98	3.18	1	
	50 – 54	6 310	25.43	1.49	0	
	55 – 59	833	23.36	0.17	6	
<b>Total</b>			<b>24.30</b>	<b>19</b>	<b>75% (45, 117)</b>	
All Commands	15 – 19	6 195	13.37	0.83	0	
	20 – 24	32 846	20.22	6.64	10	
	25 – 29	38 576	18.61	7.18	8	
	30 – 34	43 756	20.64	9.03	5	
	35 – 39	56 431	24.40	13.77	7	
	40 – 44	53 774	25.00	13.44	7	
	45 – 49	25 107	26.98	6.77	6	
	50 – 54	10 196	25.43	2.59	2	
	55 – 59	1 206	23.36	0.28	6	
<b>Total</b>			<b>59.45</b>	<b>51</b>	<b>86% (64, 113)</b>	



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During the 2007 – 2011 period, the Army SMR increased and became significant, relative to the 2002 – 2006 period, whereas the SMRs for Air Force and Navy/Other remained non-significant. Again, the sensitivity analysis combining Air Force with Navy/Other did not result in generating significant findings.

**Table 3-4: Standardized Mortality Ratios for Suicide in CAF Regular Force Males by Command, 2007 – 2011.**

Command	Age	Number of CF Personnel (PYs)	Canadian Male Suicide Rate (per 100,000)	Expected # of Male CAF Suicides	Observed # of Male CAF Suicides	SMR for Suicide (95% Confidence Intervals)
Army	15 – 19	2 552	12.23	0.31	0	
	20 – 24	23 167	18.56	4.30	9	
	25 – 29	24 347	17.40	4.24	11	
	30 – 34	17 374	18.60	3.23	6	
	35 – 39	14 880	21.40	3.18	5	
	40 – 44	13 121	24.30	3.19	5	
	45 – 49	8 417	26.09	2.20	3	
	50 – 54	2 796	25.70	0.72	0	
	55 – 59	387	23.40	0.09	0	
	<b>Total</b>			<b>22.53</b>	<b>39</b>	<b>173% (123, 236)<sup>†</sup></b>
Air Force	15 – 19	429	12.23	0.05	0	
	20 – 24	5 876	18.56	1.13	0	
	25 – 29	10 039	17.40	1.90	0	
	30 – 34	9 170	18.60	1.97	3	
	35 – 39	9 363	21.40	2.43	3	
	40 – 44	10 568	24.30	3.15	3	
	45 – 49	9 442	26.09	3.08	1	
	50 – 54	3 541	25.70	1.28	0	
	55 – 59	494	23.40	0.190	0	
	<b>Total</b>			<b>14.72</b>	<b>10</b>	<b>81% (39, 148)</b>
Navy/Other	15 – 19	4 800	12.23	0.59	0	
	20 – 24	15 298	18.56	2.80	2	
	25 – 29	17 021	17.40	2.81	1	
	30 – 34	16 796	18.60	2.86	6	
	35 – 39	18 627	21.40	3.56	4	
	40 – 44	19 532	24.30	4.17	5	
	45 – 49	16 718	26.09	3.74	0	
	50 – 54	7 986	25.70	1.69	0	
	55 – 59	1 617	23.40	0.30	0	



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Command	Age	Number of CF Personnel (PYs)	Canadian Male Suicide Rate (per 100,000)	Expected # of Male CAF Suicides	Observed # of Male CAF Suicides	SMR for Suicide (95% Confidence Intervals)
	<b>Total</b>			<b>22.60</b>	<b>18</b>	<b>72% (43, 114)</b>
All Commands	15 – 19	7 781	12.23	0.95	0	
	20 – 24	44 341	18.56	8.23	11	
	25 – 29	51 407	17.40	8.95	12	
	30 – 34	43 340	18.60	8.06	15	
	35 – 39	42 870	21.40	9.18	12	
	40 – 44	43 221	24.30	10.50	13	
	45 – 49	34 577	26.09	9.02	4	
	50 – 54	14 323	25.70	3.68	0	
	55 – 59	2 498	23.40	0.58	0	
	<b>Total</b>			<b>59.86</b>	<b>67</b>	<b>112% (87, 143)</b>

† Statistically significant.

Due to small numbers and 1-year timeframe of the SMRs presented in Table 3-5, only the total SMRs were presented. No cases occurred in the Air Force, and again the Army and Navy/Other SMRs were non-significant. However, in this instance, the sensitivity analysis combining both Air Force and Navy/Other resulted in an SMR significantly below that of the expected rate [26% (95% CI: 3, 95)]. This very low SMR was strongly driven by the absence of any Air Force cases in 2012.

**Table 3-5: Standardized Mortality Ratios for Suicide in CAF Regular Force Males by Command, 2012 Only.**

Command	Number of CF Personnel (PYs)	Canadian Male Suicide Rate (per 100,000)	Expected # of Male CAF Suicides	Observed # of Male CAF Suicides	SMR for Suicide (95% Confidence Intervals)
Army	22 066	21.17	4.67	8	171% (74, 337)
Air Force	11 737	21.17	4.84	0	N/A
Navy/Other	24 137	21.17	2.75	2	39% (5, 141)
All Commands	57 940	21.17	12.27	10	82% (39, 150)

Figure 3-2 illustrates the differences in SMRs for the different commands. Although the Army SMR was above 100%, compared to the other commands that reported SMRs below, no significant differences were noted between the three command SMRs for 2002 – 2006.

The 2007 – 2011 confidence intervals for the Army command did not overlap with those for the Navy/Other commands, suggesting that there was a significant difference in the SMRs between these commands. However, the confidence intervals between the Army and the Air Force commands did overlap; there is therefore no



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significant difference between these commands. While this significant difference between Army and Navy/Other suggests that command alone may be responsible for the significant difference in SMRs in Army versus non-Army, this type of analysis fails to factor in any of the multifactorial contributors to suicide. In other words, while it may appear that being in the Army puts CAF members at higher risk of suicide relative to members of other commands, there may be underlying inherent differences between the commands that are not controlled for in this type of analysis.

With respect to the 2012 SMRs, while the Navy/Other SMR was lower than the Army command SMR, these numbers only represent findings for a one-year time period. As this report has outlined, the numbers may vary substantially from year to year, in part due to chance alone. The fact that the confidence intervals for both Army and Navy/Other SMRs are very wide supports this caveat and suggests that the 2012 SMRs should be interpreted with caution.

### 3.3.3 Suicide in Regular Force Males in the Army Combat Arms Occupations, 2002 to 2015

The suicide rate in Army combat arms occupations in the Regular Force male population was also calculated. Between 2002 and 2015, there were a total of 63 suicides among Regular Force males who had a combat arms MOSID. There were no suicides during this time frame in females with a combat arms MOSID.

The suicide rate in the Regular Force male population who were in an Army combat arms occupation appeared higher than the overall suicide rate of all non-combat arms Regular Force males [31.65 (95% CI, 24.51, 40.86) versus 16.52 (95% CI, 13.48, 20.22)]. As the confidence intervals between the two rates did not overlap, the difference was statistically significant, indicating an increased risk of suicide in Regular Force male combat arms relative to those in non-combat arms. The reclassification of some cases had no impact on the results of this analysis, as none of the newly classified Army cases were combat arms, thereby remaining in the “non-combat arms” category for the purposes of this analysis.

### 3.3.4 Three-Year Moving Average of Suicide Rates for Regular Force Males by Command, 2002 – 2015

Because the annual suicide numbers for the Canadian Armed Forces are small, they are highly influenced by random annual variability. Moving averages, which take an average of the year of interest as well as the previous and following year<sup>7</sup>, has been used by others in a similar military suicide context [12]. This method attempts to control the aforementioned variability caused by small numbers and provide a snapshot of potential temporal trends in the data.

Figure 3-3 shows the moving average trends for all commands combined (represented by the triangular markers), Army command only (represented by the diamond markers) and for the Non-Army command (represented by the square markers). What this figure illustrates is that while the Army command rate was always slightly higher or equal to other commands grouping up until 2008, 2009 onwards showed a larger rate increase in Army than in non-Army or All commands. This rise in the Army mean appeared to have stopped post-2012, but the average remained well above pre-2010 levels. Between 2009 and 2012, the non-Army moving average rate appeared to be decreasing, but subsequently returned to pre-2011 levels.

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<sup>7</sup> For example, the moving average value for 2006 would be an average of 2005, 2006 and 2007. For 2002 and 2015 where there are no prior and/or subsequent years, the moving average was based on two years' worth of data (e.g. 2015 = average of 2014 and 2015).





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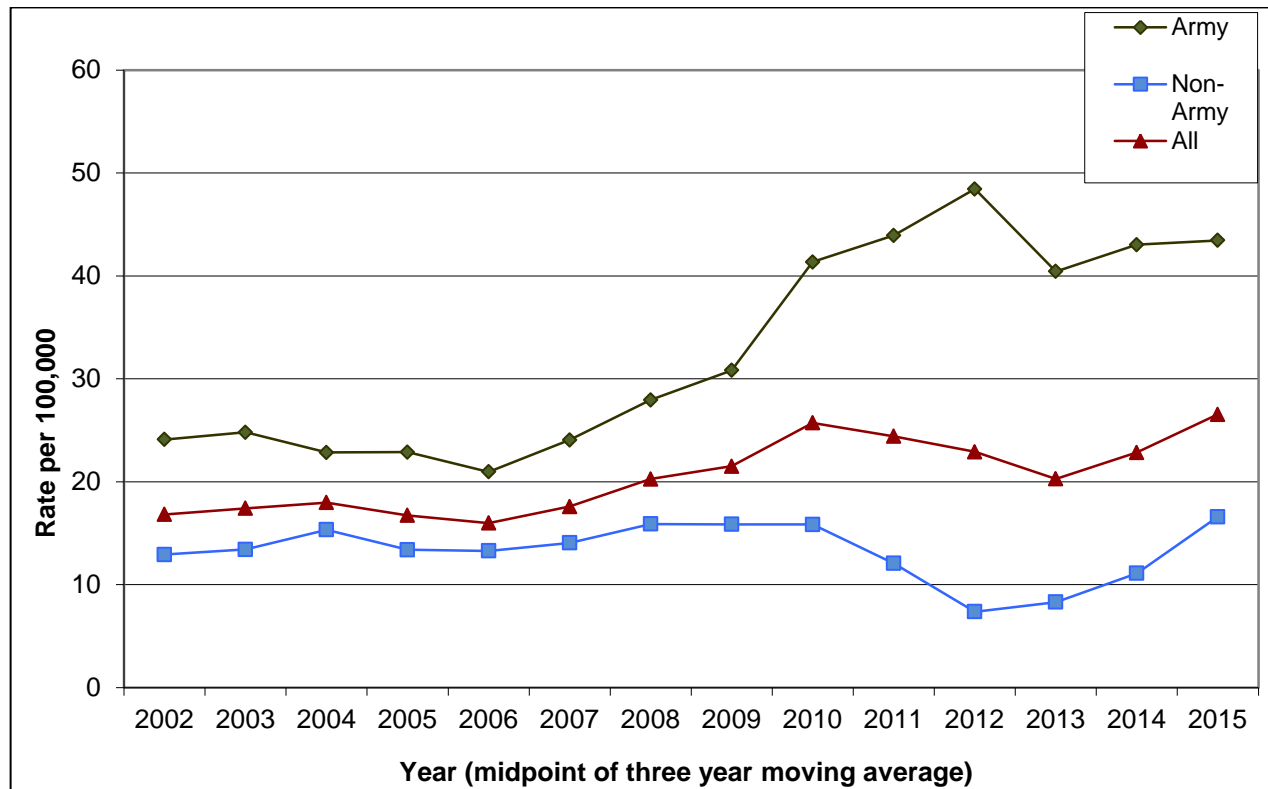


Figure 3-3: Three-Year Moving Averages by Command, Canadian Armed Forces, 2002 – 2015.

### 3.4 Data Limitations

The results of this chapter are subject to several potential limitations and when interpreting the data one must consider the following:

- 1) The numbers on which these analyses are based are very small and unstable; consequently, these findings must be interpreted with caution.
- 2) Furthermore, since the individual's last known unit/base was used to categorize command, this did not take into account that the individual may have just recently been posted to that command and therefore not really have functioned under that command for an appreciable amount of time (for example, when one goes on training).
- 3) The denominators for this study (number of CAF Regular Force males in each command) may also be inaccurate since the DHRIM system is not systematically updated. Consequently, denominator data may differ, depending on when the report was run by DHRIM.
- 4) The lack of DHRIM data prior to 2002 makes it impossible to ascertain whether the pre-Afghanistan suicide experience for Army command relative to non-Army command was any different to what is described here.
- 5) Finally, the wide confidence intervals for many of the rates reported here indicate that the analyses may not have the power to detect statistically significant differences.



## **Chapter 4 – Discussion and Conclusions**

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### **4.1 Discussion**

As shown in Table 2-1, fourteen CAF Regular Force men took their own lives in 2015. This crude number is similar to those in 2012, 2013, and 2014 (10, 9, and 16 suicides, respectively). The CAF compares suicide rates in five year blocks, with the intent of minimizing the year-to-year variability when the number of expected year events is small (in epidemiological terms). 2015 is the first year in a new block, with the rate for 2015 (24.9 per 100,000) being not significantly different from the previous five-year block (2010 – 2014, 23.5 per 100,000).

While the crude suicide rate had increased in the 2010 to 2014 time period compared to earlier years, this increase was also not statistically significant. During the five-year time period of 2010 to 2014, there would need to have been a total of 83 suicides (compared to the 68 that occurred) for there to be a statistically significant increase from the rate for 2005 to 2009. As a result of low numbers of observed events, the power to detect small but important differences in suicide rate is limited in the CAF. Within the constraints of this limitation, Regular Force male suicide rates in the CAF as a whole thus appear stable.

The SMR analysis comparing the number of observed CAF Regular Force male cases to expected cases based on Canadian rates (Table 2-2) is also limited by the small numbers. Note that if the 95% confidence intervals include 100%, this indicates that the difference between CAF Regular Force male rates and Canadian rates is not statistically significant. However, in the ten-year period from 1995 to 2004 the suicide rate among CAF Regular Force males was statistically significantly lower than the corresponding Canadian rate.

The finding that CAF Regular Force male suicide rates are not significantly higher than the CGP rates is consistent with a broad range of studies comparing the risk of suicide in military personnel relative to civilians [13]. The recent release by Statistics Canada of 2012 general population suicide data allowed the inclusion of that year in the SMR calculations in this report, but this did not change the fundamental picture of similar age-adjusted male suicide rates in the CAF relative to the general population.

The association of deployment and suicide was explored in two complementary ways: First, the SMR for CAF personnel with and without a history of deployment was calculated. This approach compares the suicide rates in each CAF group (ever deployed vs. never deployed) to a single comparison group<sup>8</sup> (the Canadian general population). These results (Table 2-3) showed no statistically significant difference in the SMR among those with and without a history of deployment – both CAF groups had SMRs that were not statistically different from 100%.

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<sup>8</sup> While the comparison group was the same, differences in the age distribution of personnel with and without a history of deployment were accounted for.



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A second complimentary approach was used to explore this issue. Table 2-4 showed the results of direct standardization analysis in which the suicide rate of personnel with and without a history of deployment are compared directly with one another (as opposed to the indirect approach comparing each with the general population shown in Table 2-3). This direct standardization analysis was done in both five year blocks (to be consistent with the other analyses and with past reports) and in ten year blocks (to increase statistical power and to conceptually bracket period before and after the most intense phases of the Afghanistan-related operations, 1995 – 2004 vs. 2005 – 2014). Both the five-year and ten-year block approaches yielded convergent results: In 2010 – 2014, previously deployed personnel had a greater risk of suicide than non-deployed personnel (suicide rate ratio of 1.56). However, this difference did not reach statistical significance, with a confidence interval that included 1.00 (0.91 – 2.66). In the ten-year period of 2005 – 2014, the suicide rate ratio (1.48) was similar to that in 2010 – 2014, but the confidence interval narrowed (to 0.98 – 2.22), coming very close to statistical significance. Data from 1995 – 2004, in contrast, showed no such trend to higher rates in those with a history of deployment (suicide rate ratio of 1.00), pointing to a potential emerging change in the relationship between ever having deployed and suicide in the CAF over time.

This is thus some potentially discordant evidence emanating from the two approaches to standardized analyses (indirect vs. direct standardization): Indirect standardization pointed to similar suicide SMRs in personnel with and without a history of deployment (both of which were similar to male Canadians in the general population, adjusted for age). Direct standardization in both five and ten-year blocks pointed instead to an elevated risk of suicide in men who had previously deployed (relative to men who had not deployed), though this fell just shy of statistical significance. The suicide rate ratio for 2015 males with and without a history of deployment (1.49) was similar to that in 2005 – 2014, though the small number of events in 2015 again makes this estimate imprecise.

It should be noted that:

- 1) While direct standardization is usually preferred in epidemiology as this approach allows for the comparison of two different rates (e.g. suicide rate in those with a history of deployment compared to the rate in those without a history), it is also very unstable in situations where there are small numbers, and where the number of events and resultant rates are prone to random variation (both true for suicides by Regular Force males).
- 2) However, a key advantage of the direct standardization approach is that this can be done with CAF data alone; it is not dependent on the release of suicide data on the general population, which typically occurs three years or so after the fact. Thus, direct standardization may identify important trends before they can be detected in the SMRs.
- 3) The generation of both direct and indirect rates is only a univariate look into the underlying risk factors associated with suicides among Regular Force males in the CAF; in other words, the analysis only looks at the relationship between one factor and suicide, thereby overlooking suicide's multifactorial etiology. In the case of the directly standardized rate for suicide between 2005 and 2014 by history of deployment, it would appear that within this time period, younger CAF Regular Force males were less likely to have deployed, compared to older (middle-aged) Regular Force males who were more likely to have deployed. However, with the knowledge that middle-aged males are now the highest risk group for suicide in the CGP, [7] the strong possibility emerges that other factors, in addition to deployment, may also contribute to an increased suicide risk.
- 4) Both of these analyses have been conducted using a very crude measure of deployment (dichotomous yes or no to having any history of deployment). This approach diminishes the differential influence of



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the varying characteristics of any deployment (notably the extent of exposure to psychological trauma) on the probability of a Regular Force male taking his own life. Given the small annual number of suicides, this has been the categorization of deployment that was best suited to this limitation. However, this means that all results based on it must always be interpreted with caution. Regardless, changes in the nature of the average deployment over the period of 1995 – 2004 (largely peacekeeping deployments to areas of less intense conflict) relative to 2005 – 2014 (largely Afghanistan-related deployments to areas of intense conflict) is a plausible mechanism for the apparent change over time of the relationship between deployment and suicide in the CAF.

This report also provides some background information on the demographics, risk factors, and access to care prior to deaths by suicide of Regular Force males that occurred in 2015. While it would appear that prior mental health problems (especially mood disorders), failing spousal relationships, and being subject to disciplinary/legal/administrative proceedings were frequently reported as characteristics of people whose suicides are reported here, it is impossible to comment on whether the prevalence rates reported here are appreciably different from those found in the rest of the Regular Force male CAF population. However, these findings are consistent with findings in other military organizations, [14], [15] and, as such, potentially provide some insight as to where suicide prevention and action should continue to be directed – namely towards the continued timely access to care, and in the provision of relationship, debt and anger counselling and education.

The findings from the 2015 MPTSR process has also resulted in the development of a number of recommendations that will require assessment from various CAF and DND directorates who are involved in the health and well-being of the CAF. While it remains impossible to prevent each and every suicide, the CAF continues to actively work towards identifying and addressing the modifiable risk factors associated with an increased risk of suicide, both among Regular and Reserve Force personnel.

The further analysis of occupational factors (specifically, Environmental Command and combat-arms vs. non-combat arms MOSID) presented in Chapter 3 extended results first reported in 2014 by:

- 1) Including 2015 suicide data; and
- 2) Reclassifying the environmental command seven individuals from a non-Army command to an Army command, based on more in-depth validation of administrative data.

The results were nevertheless similar to those in the 2014 report. Specifically, it was noted that over the period 2002 – 2015, the crude suicide rate was significantly higher in Army commands relative to non-Army commands (33.3 vs. 12.9 per 100,000 per year). This finding was confirmed in adjusted analyses, which showed an elevated suicide rate ratio (2.49) in Army command personnel over the period 2002 – 2015. These findings were also mirrored in analysis of combat arms personnel, who had significantly greater crude suicide rates than those in other trades.

Analysis in five-year blocks showed no difference in crude suicide rate as a function of command in 2002 – 2006, but in both 2007 – 2011 and in 2012 – 2015, significantly higher rates in Army command personnel were seen. Exploration of the rates in the different commands using three-year moving averages also pointed to increases in suicide risk in Army commands over the periods in question. In contrast to the analyses on deployment and suicide in which the findings from indirect adjustment (i.e. the SMRs) were somewhat different from the findings from direct adjustment (i.e. the suicide rate ratios), the SMR findings on command confirmed those of the direct adjustment: Over the period 2002 – 2006, there was no difference in SMRs



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among personnel in different commands. In contrast, in 2007 – 2011, the SMR was significantly elevated in Army command personnel (1.73, indicating a greater risk of suicide relative to Canadian men of the same age) but not in non-Army commands (in which SMRs were not significantly elevated). The SMRs for 2012 (the most recent year for which SMRs can be calculated) in Army and non-Army personnel was similar to those in 2007 – 2011, but their confidence intervals all included 1.00 because of the substantial variability in a single year's data. The results of these comparative analyses may also be influenced by some of the same underlying risk factors and confounders that complicate the discussion about the link between deployment and suicide risk in the CAF.

Overall, it is clear from the evidence presented in this report and in the 2014 report that the narrative around suicide in the Canadian Armed Forces has been gradually evolving over the last 20 years. Over time, the strong protective relationship between service in the CAF and suicide has been slowly attenuating, and a new landscape is emerging in which we see higher rates in:

- 1) Regular Force males within the Army command;
- 2) Regular Force males within the combat arms; and
- 3) Previously-deployed Regular Force males.

These patterns are concerning, but one cannot conclude that this demonstrates insufficient mental health resources in the CAF. In fact, data from the Mental Health Survey demonstrate that access to care in the CAF has increased dramatically since 2002 and is well above that seen in the provincial and territorial health care systems [28]. In particular, care-seeking in CAF personnel with suicidality in 2013 was significantly higher than in CAF personnel in 2002; it was also greater than in the Canadian general population in both 2002 and in 2013 [29].

It is far more probable that the changing trends are caused by two other larger forces at play:

- 1) There is strong evidence that the CAF mission in Afghanistan has had a powerful impact on the mental health of an important minority of personnel who deployed in support of it [30]. Clear differences in the prevalence of mental disorders among personnel who deployed in support of that mission and other personnel have also been demonstrated [30], [33], [34]. The clear conceptual and empirical links between deployment-related trauma, mental disorders, and suicidality [21] may explain these trends.
- 2) Second, the CAF's retention practices for personnel with mental disorders have evolved. Personnel who have recovered fully from mental disorders may continue to serve provided that they meet Universality of Service standards [28], [30]. For those who do not recover completely, time to release is now more prolonged than in the past.

Still, we must reiterate here that suicide is a multifactorial event that is explained by more than deployment alone; consequently, disproportionate focus on selected factors runs counter to the CAF's public health approach to suicide prevention. Focusing only on deployment, PTSD or any of the other risk factors discussed in this report is an ineffective approach to suicide prevention [21].

The limitations in the analyses laid out above make it clear that understanding the complex phenomenon of suicide using simple univariate epidemiological analyses is no longer sufficient to adequately and accurately describe the Regular Force male suicide experience in the CAF, nor do they provide sufficient evidence to confidently make pronouncements on the presence or importance of potential risk factors. New data sources,



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including the 2013 Canadian Forces Mental Health Survey, provide us with additional tools and resources to better elucidate the underpinnings of the relationship between suicide and Environmental Command. Additionally, there now exist 20 years of suicide surveillance data that may be useful in conducting more rigorous, in-depth multivariate analyses (including regression analyses). To do this properly, risk factor information is needed on all suicides and from a control group of CAF personnel [16]. These advanced approaches will allow for the control of age as a confounder in deployment, as well as other risk factors for suicide. They will also allow the CAF to determine the optimal approach to classifying deployment; for the purpose of the analyses in this report, deployment is defined as any deployment, of any length of time, and of any type (combat vs. peacekeeping vs. humanitarian). Alternate approaches in the literature have included looking at the total number of deployments [17], [18], [19], length of first deployment, [18] total duration of all deployments, [18], [19] specific location(s) of deployment, [18] isolation level of deployment(s) [17], occupation during deployment [17], and the categorization of combat exposure [17], [20]. We expect to conduct this analysis in the future, pending access to population-level data that are required to conduct such an analysis. In the process of undertaking this analysis, the different aforementioned approaches to qualifying deployment will all be considered.

### 4.2 Conclusions

The following conclusions are reached with the understanding that statistical analysis may not identify a true difference due to the small total number of suicides, i.e. the power of the study is low:

- 1) From 1995 to 2015 there has been no statistically significant change in the overall suicide rate of CAF Regular Force males.
- 2) The rate of suicide when standardized for age and sex is not statistically significantly different from that of the CGP.
- 3) Direct standardization suggests that a history of deployment is now emerging as a risk factor for Regular Force males in the CAF since 2010. However, deployment may be confounded by other unexplained variables.
- 4) High prevalence of mood disorders, spousal/intimate partner breakdown and/or of career-related proceedings may be indicators of heightened suicide risk in CAF Regular Force males.
- 5) Analyses suggest that there is a significantly higher crude rate of suicide in Regular Force males in the Army command relative to other CAF commands. This may be in part driven by the significant difference in the crude Regular Force male suicide rate for the combat arms trades relative to the non-combat arms suicide rate.
- 6) The evidence collected in the annual reports is used to:
  - a) Ensure that clinical and prevention programmes optimally target high risk individuals;
  - b) Identify gaps in prevention and clinical offerings related to mental health; and
  - c) Ascertain why some individuals are not availing themselves of available prevention and clinical resources prior to taking their own lives.
- 7) With more than 20 years of Regular Force data, advanced statistical approaches will need to be explored in future analyses to better and more accurately describe the suicide experience in the CAF.





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12. ABSTRACT (Brief and factual summary of the document.)

Suicide is a tragedy and an important public health concern. Suicide prevention is a top priority for the Canadian Armed Forces (CAF). In order to better understand suicide in the CAF and refine ongoing suicide prevention efforts, the Directorate of Force Health Protection (DFHP) and the Directorate of Mental Health (DMH) regularly conduct analyses to examine suicide rates and the relationship between suicide, deployment and other potential suicide risk factors. This report is an update covering the period from 1995 to 2015.

This report describes crude suicide rates from 1995 to 2015, comparisons between the Canadian population and the CAF using Standardized Mortality Ratios (SMRs), and suicide rates by deployment history using SMRs and direct standardization. It also examines variation in suicide rate by command and, using data from the Medical Professional Technical Suicide Reviews (MPTSR), looks at the prevalence of other suicide risk factors in suicides which occurred in 2015.

Between 1995 and 2015, there were no statistically significant increases in the overall suicide rates. The number of Regular Force males that died by suicide was not statistically higher than that expected based on Canadian male suicide rates. While the suicide rate among males with a history of deployment was not significantly higher than in comparable civilians, rate ratios indicated that there was a trend for those with a history of deployment to be at an increased risk of suicide compared to those who have never been deployed; however, the difference was not statistically significant. These rate ratios also highlighted that, since 2006 and up to and including 2015, being part of the Army command significantly increases the risk of suicide, relative to those who are part of the other commands.

The most recent findings suggest a trend towards an elevated suicide rate ratio (1.48, CI: 0.98, 2.22) in the past decade in those Regular Force males with a history of deployment relative to those Regular Force males without a history of deployment. However, this finding fell just short of statistical significance. Regular Force males under Army command were at significantly increased risk of suicide relative to Regular Force males under non-Army commands (age-adjusted suicide rate ratio = 2.49, CI: 1.81, 3.42), with a trend towards a widening gap between the rates in Army and non-Army command Regular Force males over the past five years. Regular Force males under Army command in the combat arms trades had statistically significantly higher suicide rates (31.65/100,000, CI: 24.51, 40.66) than non-combat arms Regular Force males (16.52/100,000, CI: 13.48, 20.22).

Results from the 2015 MPTSRs is in support of a multifactorial causal pathway (this includes biological, psychological, interpersonal, and socio-economic factors) to suicide rather than a direct link between single risk factors (e.g. Post-Traumatic Stress Disorder (PTSD) or deployment) and suicide.

Suicide rates in the CAF did not significantly increase over time, and after age standardization, they were not statistically higher than those in the Canadian population. However, small numbers have limited the ability to detect statistical significance. History of deployment continues to be a possible risk factor for suicide in the CAF. The increased risk in Regular Force males under Army command compared to Regular Force males under non-Army command is another recent finding. Deployment-related trauma (especially that related to the mission in Afghanistan) and resulting mental disorders are plausible mechanisms for these associations. However, residual confounding



may also be at play (e.g. by disproportionate risk of childhood trauma or other lifetime trauma in Army personnel or those who deploy). Further research with other data sources will be needed to explore these hypotheses in depth.

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Tout suicide est une tragédie et un problème important de santé publique. La prévention du suicide est une haute priorité des forces armées canadiennes (FAC). Afin de mieux comprendre le suicide dans les FAC et de raffiner les efforts continus de prévention, la Direction – Protection de la santé de la Force (DPSF) et la Direction de la santé mentale (DSM) mènent régulièrement des analyses afin d'examiner les taux de suicide et la relation entre le suicide, le déploiement, et d'autres risques potentiels de suicide. Ce rapport est une mise à jour couvrant la période de 1995 à 2015.

Le présent rapport décrit les taux bruts de suicide de 1995 à 2015, les comparaisons entre la population canadienne et les FAC au moyen des ratios standardisés de mortalité (RSM) et les taux de suicide chez les personnes ayant des antécédents de déploiement au moyen des RSM et de la normalisation directe. Il examine également la variation dans le taux de suicide en fonction du commandement et, au moyen de données tirées des Examens techniques des suicides par des professionnels de la santé (ETSPS), on s'est penché sur la prévalence d'autres facteurs de risque dans les suicides qui ont eu lieu en 2015.

Entre 1995 et 2015, il n'y avait pas d'augmentation statistiquement significative des taux globaux de suicide. Le nombre d'hommes de la Force régulière décédés par suicide n'était pas statistiquement plus élevé que le taux escompté en fonction des taux de suicide chez les hommes dans la population canadienne. Bien que le taux de suicide chez le personnel ayant fait l'objet d'un déploiement ne soit pas beaucoup plus élevé que chez la population civile comparable, les ratios de taux indiquaient que ceux qui ont des antécédents de déploiement présentaient une tendance statistiquement non significative de risque accru comparativement à ceux qui n'ont jamais fait partie d'un déploiement. Ces ratios de taux laissent aussi voir que, depuis 2006 et jusqu'à et incluant 2015, le fait de faire partie du commandement de l'Armée de terre accroît, de manière statistiquement significative, le risque de suicide par rapport à ceux qui font partie d'un autre commandement.

Les constatations les plus récentes laissent maintenant voir une tendance vers un ratio de taux de suicide ajusté élevé (1,48, IC : 0,98, 2,22) au cours de la dernière décennie chez ceux qui avaient des antécédents de déploiement comparativement à ceux qui n'en avaient pas. Toutefois, cette conclusion ne représentait pas tout à fait une importance sur le plan statistique. Le personnel de l'Armée de terre présentait un risque de suicide nettement accru par rapport aux autres militaires (ratio de taux de suicide ajusté en fonction de l'âge = 2,49, IC : 1,81, 3,42), et on note une tendance vers un élargissement de l'écart entre les taux du personnel de l'Armée de terre et ceux des autres militaires au cours des cinq dernières années. Le personnel mâle de l'Armée de terre faisant partie des métiers d'armes de combat présente des taux de suicide nettement plus élevés (31,65/100 000 personnes, IC : 24,51, 40,66) que ceux des autres membres de l'Armée de terre ne faisant pas partie des métiers d'armes de combat (16,52/100 000 personnes, IC : 13,48, 20,22).

Les résultats des ETSPS de 2015 appuient un enchaînement de causalité qui est plus multifactoriel (ceci inclut des facteurs biologiques, psychologiques, interpersonnels, et socio-économiques) plutôt qu'un lien direct entre des facteurs de risques individuels (p. ex. état de stress post-traumatique



(ESPT) ou le déploiement) et le suicide.

Les taux de suicide dans les FAC n'ont pas augmenté de façon marquée avec le temps, et ils ne sont pas plus élevés que ceux de la population canadienne lorsqu'ils sont normalisés selon l'âge. Toutefois, le nombre peu élevé de sujets pourrait avoir restreint la capacité à détecter une signification statistique. Les antécédents de déploiement continuent à être un facteur possible de risque de suicide dans les FAC. Le risque excessif au sein de l'Armée de terre est également une constatation nouvelle. Le trauma lié au déploiement (particulièrement celui lié à la mission en Afghanistan) et les troubles mentaux qui en découlent sont des mécanismes plausibles de ces associations. Cependant, un effet de confusion résiduel pourrait aussi entrer en jeu (par exemple un risque disproportionnel provenant d'un traumatisme de l'enfance ou d'un autre traumatisme vécu chez le personnel de l'Armée de terre ou chez ceux qui sont déployés) d'autres recherches seront nécessaires pour étudier ces hypothèses en profondeur.

13. KEYWORDS, DESCRIPTORS or IDENTIFIERS (Technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. Use semi-colons as delimiters.)

Age-adjusted rate; Canadian Forces; Canadian population; deployment; rate ratio; rates; standardized mortality ratio; suicide.