Equity in Canadian Health Research Funding

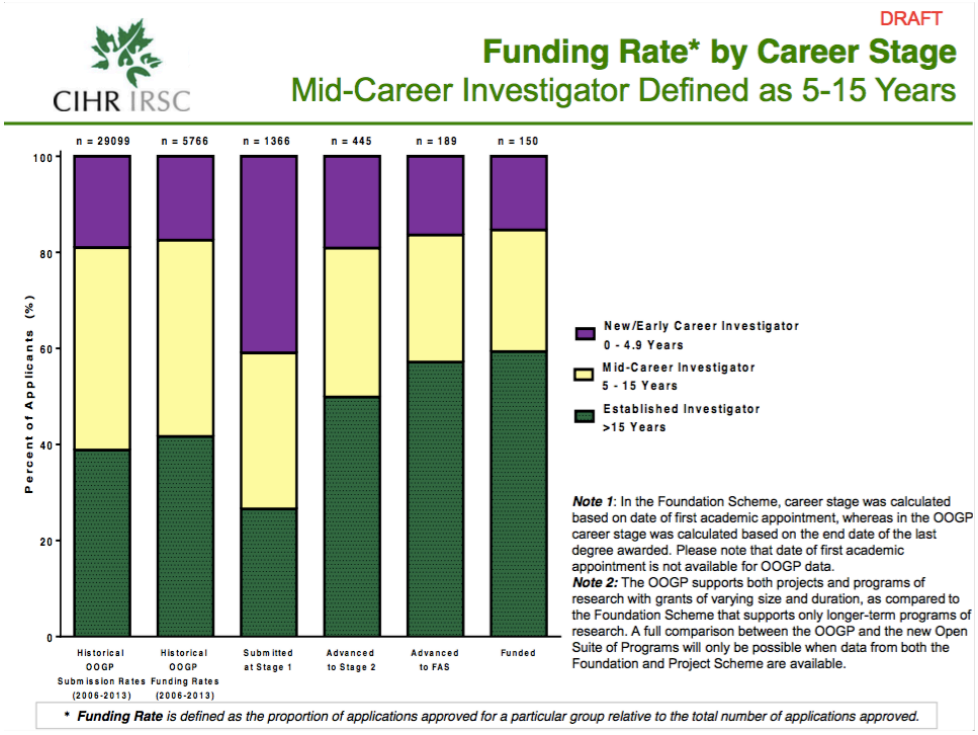
Background document originally prepared for Canadian Institutes of Health Research (CIHR) Working Group discussion by Holly Witteman 2016-08-25. Shortened & updated 2016-09-30.

BACKGROUND

Equity in health research funding is important for three main reasons. First, any systemic bias in funding allocation means that we aren't funding the best research. Second, researcher characteristics influence the topics researched and questions addressed. For example, health researchers who are women may be more likely to research issues relevant to women's health. Therefore, CIHR funding distribution can also influence which people in Canada are served by CIHR-funded research. Third, funding equity by sex and career stage are necessary for CIHR to comply with relevant legislation, particularly CIHR Act 4b, 4c, 4e, 4j and 5b.

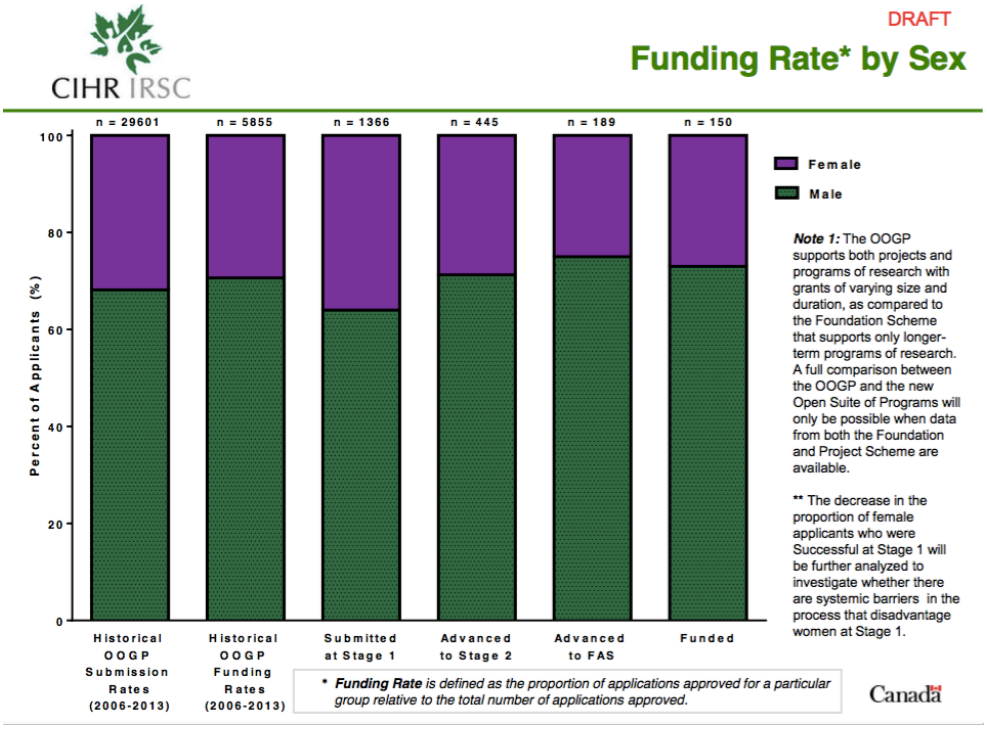
Previous open funding programs at CIHR were approximately equitable in terms of career stage. Data from the Open Operating Grants Program (OOGP) 2006-2013 presented by CIHR to university delegates in Sep 2015 are shown below in Figure 1; see two leftmost columns. Note that because career stage is defined slightly differently for OOGP, the OOGP may have been better for early career investigators than it appears. The OOGP data are based on years since terminal degree, meaning that early career investigators in the figure below may represent early-career investigators who are earlier in their careers than the 0-5 year span defined in the Foundation Scheme and Project Scheme.

Figure 1. CIHR data on funding rates by career stage (see leftmost 2 columns)



OOGP funding may not have been equitable in by sex of nominated principal applicant (NPA). Previous overall OOGP data, shown in Figure 2 below, suggest there may have been small differences resulting in slightly lower overall funding for female NPAs. Analyses conducted on OOGP funding in 2001-2011 demonstrated that, using female NPAs with age <45 as the reference class, the odds ratio (OR) and 95% confidence interval (95% CI) for female NPAs age >45 were OR 0.91 (95% CI 0.80-1.01). Male NPAs age <45 had OR 1.12 (95% CI 1.02-1.24) and male NPAs age >45 had OR 1.00 (95% CI 0.91-1.10). (Tamblyn et al., 2016[1])

Figure 2. CIHR data on funding rates by sex of NPA (see leftmost 2 columns)



The Foundation Scheme program may be entrenching inequities in funding across career stages at a critical period of low overall funding, compromising future research for decades. In the first Foundation Scheme, although early-career investigators (ECIs, defined as those less than 5 years into their independent careers) received 15% of grants, they received only 5% of total funds. In the second Foundation Scheme, ECIs received 28% of grants and 12% of total funds. This is partly attributable to the fact that ECIs are restricted to 5-year grants in the Foundation Scheme whereas mid- and senior-career investigators (MCIs and SCIs, 5-15 years and 15+ years, respectively) receive 7-year grants. However, even if we accept that this is a fair restriction—ignoring the fact that ECIs, MCIs and SCIs all compete on the same fields and ECIs are the best positioned to build upon a 7-year funded program—then **ECIs are still receiving substantially fewer total funds**. It is difficult to isolate funds allocated to MCIs vs. SCIs because these data are not publicly available; however, it appears that **MCIs may be similarly disadvantaged**.

[1] http://cmajopen.ca/content/4/2/E213.full (open access peer-reviewed pub)

In the first Project Scheme, the overall success rate was 13% but the success rate for ECI applicants was a little under 7% before distribution of additional funds dedicated to ECIs. The success rate for MCIs was also substantially lower than that of SCIs. Table 1 shows full funding success rates by career stage in the CIHR reforms. **ECIs and MCIs are experiencing substantially lower success rates** compared to SCIs. This is a drastic departure from the former relatively equitable success rates within the OOGP, and is compounding the effects of low funding rates for researchers who are earlier in their careers.

Table 1. Funding success rates (full funding) by career stage in CIHR reforms

	ECI	MCI & SCI*	MCI	SCI
Foundation Scheme 1	4%	16%	--	--
Foundation Scheme 2	12%	13%	--	--
Project Scheme 1 before $30M	7%	--	12%	16%
Project Scheme 1 after $30M	11%**	--	12%	16%

*Split between MCI and SCI not published for Foundation Scheme. Note that Foundation Scheme 1 and 2 had a managed intake for MCI and SCI whereas all ECIs were eligible to apply.
**Additional 4% due to use of $30M funds allocated "with a focus on" ECIs. These additional funds funded 40 ECI applicants. Some of the $30M were also used to fund bridge grants.

Female applicants to the Foundation Scheme program have received significantly fewer grants compared to male applicants. See Table 2 for an overall picture of funding success in the CIHR reforms by sex of applicant.

Table 2. Funding success rates by sex of applicant in CIHR reforms

	Overall success rate for male applicants	Overall success rate for female applicants
Foundation Scheme 1	13%	8%
Foundation Scheme 2	14%	10%
Project Scheme 1	13%	12%

I offer three notes relevant to equity by sex of applicant here. First, in the second Foundation Scheme, the difference was largely driven by differences in MCI and SCI applicants. Female MCI and SCI applicants had a success rate of 8% compared to 16% for MCI and SCI male applicants. Second, for reference, I published analyses of the first Foundation Scheme results as a rapid response[2] along with the full R code.[3] Third and most importantly, it's critical to understand that female researchers do not receive discounts on research costs. This means that even if parity is achieved in Project Scheme, the disparity in Foundation Scheme means that female health researchers in Canada are able to do less total research. As noted above, female researchers are more likely to conduct research relevant to women's health, meaning that **this imbalance may be resulting in women in Canada being underserved by CIHR-funded research**.

[2] http://cmajopen.ca/content/4/2/E213.full/reply#cmajo_el_1600 (open access rapid response)
[3] https://github.com/hwitteman/cihr-analyses/blob/master/CIHRFSmf.R (open code)

In fact, deeper analyses of Foundation Scheme 2 data[4] show that **among MCIs and SCIs, female awardees were granted only 70% of the funds awarded to their male peers**. Among ECIs, female applicants were awarded 87% of the funds awarded to their male peers. These analyses further show that at Stage 1, where the criteria focus primarily on the applicant, success rates had a significant gap between male applicants (32%) and female applicants (22%). However, at Stages 2 and 3, where the criteria focus on the quality of the research, success rates were approximately equivalent, as they were in the Project Scheme (see Table 2 above). Taken together, these statistics suggest that **female applicants do equally excellent research, but their excellence as researchers is not judged fairly**.

The National Institutes of Health (NIH) in the United States has, over time, instituted informal and then formal payline adjustments for ECIs to assist with unacceptably low funding rates for ECIs. This adjustment was implemented as a 15% success rate for early career investigators was deemed "dismal".[5] Paylines are the percentile within a competition below which NIH applications are largely funded. The actual paylines vary from institute to institute, but for example, the National Heart, Lung, and Blood Institute's published payline for R01s is 14 (14th percentile) whereas for early stage investigators it is 24 (24th percentile).[6] Other institutes have similar adjustments. The overall effect of this program has been positive for ECIs but negative for MCIs, suggesting that other agencies seeking to learn from the NIH experience should focus beyond ECIs to achieve sustainable funding across the health research enterprise.

Analyses of NIH data for over one hundred thousand funded grants suggest also that, if we define productivity as a function of the number of papers and citations generated by a funded project, **there is no difference in productivity outcomes for grants ranked between the 3rd and 20th percentile**. (Fang et al., 2016[7]) This means that with the funding rates as low as they are at CIHR, there is likely no detectable difference in productivity for grants judged by reviewers as being in the 8th vs. 12th percentile. However, there is a clear difference to the careers of health researchers, and also to the types of research that get done now and in the decades to come.

In summary, particularly given the low funding rates overall, equity in funding allocation is an urgent concern and cannot wait to be addressed. The research that is funded in the next few competitions will determine careers—and possibly health outcomes—in Canada for decades to come. It would be preferable to address inequities across multiple dimensions, including gender (rather than sex) of applicant, Indigenous health research, researchers who are Indigenous, researchers with disabilities and researchers who are people of colour. Because these categories are not currently well-captured by CIHR, it is not possible to offer data, but informal data suggest these dimensions of equity also need closer attention. CIHR is also investigating the role of language (English or French) on funding success.

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[4] https://www.dropbox.com/s/genn8r9dej9loyj/CIHR-Foundation-gender-equity-funding.pdf?dl=0 (infographic, data source noted on graphic; source of infographic not public; document was presented at CIHR Science Council)
[5] http://www.nature.com/neuro/journal/v12/n11/full/nn1109-1351.html (open access editorial)
[6] https://www.nhlbi.nih.gov/research/funding/general/current-operating-guidelines (website)
[7] https://elifesciences.org/content/5/e13323 (open access peer-reviewed pub)