



**Occupational Safety
and Health Administration**

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Benefits of the OSHA On-Site Consultation Program

An Economic Analysis

Working Paper

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Introduction

The Occupational Safety and Health Administration (OSHA) On-Site Consultation (OSC) Program has existed in several formats since 1975, yet OSHA has only recently begun efforts to quantify the impact of the program. To supplement the case studies and employer testimonials showing the positive impact that OSC has had on employers across the country, OSHA has developed preliminary quantitative estimates of the societal benefits from the OSC Program. The following paper represents research in progress and may be updated as additional benefits arise.

What Is the On-Site Consultation Program?

The OSHA OSC Program provides no-cost and confidential occupational safety and health services to small- and medium-sized businesses¹ in all 50 states, the District of Columbia, and several U.S. territories. The consultation program helps employers reduce the likelihood of workplace injuries and illnesses by working with them to identify and correct workplace hazards, provide advice for compliance with OSHA standards, and assist in establishing and improving safety and health programs. Priority is given to high-hazard worksites.² This program operates separately from OSHA enforcement efforts. However, employers must agree to correct any serious and imminent danger hazards identified in a timely manner.

Although largely funded by OSHA, the OSC Program is administered by local agencies or universities. Because the OSC Program is voluntary, requests for an on-site consultation are always initiated by the employer. After an employer makes a request, and the consultation visit is scheduled, the consultant travels to the worksite to evaluate potential hazards, work practices, and the employer's safety and health program. At the end of the visit, the consultant discusses findings with the employer and recommends improvements. All serious and imminent danger hazards that are identified must be

¹ Small establishments are defined by OSC as those with 250 or fewer employees on-site, and fewer than 500 employees corporate-wide. Medium-sized establishments are also defined as those with 250 or fewer employees on-site, but with 500 or more employees corporate-wide. Establishments with more than 250 employees on-site or more than 500 employees corporate-wide can also receive visits under the OSC Program. These size definitions are used internally by OSC and do not necessarily correspond to other Department of Labor establishment size categories.

² A "high-hazard worksite" is one that meets one of the following criteria:

- Has a days away from work, days of restricted work activity, or job transfer (i.e., DART) rate that is above the national average for that industry;
- Is in a NAICS industry that is on the OSHA-generated listing of high-hazard industries (i.e., Annual OSHA High Rate Industries Listing);
- Has one or more hazardous work processes or work areas (secondary NAICS code that appears on the High Rate Industries Listing) but is in an industry that is not on the high-hazard list;
- Meets an alternate definition developed by the state and approved by OSHA; or
- Has a large number of hazardous operations required to complete a work process and that cannot be described by a secondary NAICS code. (See OSHA, 2015 for more information.)

corrected within a specific time period agreed upon by the consultant and the employer, but no fines or penalties are assessed as a result of the visit.

During a consultation visit, the consultant completes a workplace audit to identify hazards and assess the employer’s safety and health program using OSHA Form 33, *Safety and Health Program Assessment Worksheet*, which identifies 58 attributes distributed into seven safety and health program elements, including:

- Management Leadership
- Worker Participation
- Hazard Anticipation and Detection
- Hazard Prevention and Control
- Planning and Evaluation
- Administration and Supervision
- Safety and Health Training

The consultant evaluates the employer’s safety and health program, identifies program deficiencies, and suggests corrective measures and areas for improvement.

Based on OSC Program data, between FY 2012 and FY 2016³, 28,514 establishments in the private sector received services through the OSC Program each year, on average, and these establishments employed a total of approximately 1.26 million employees. Table 1 shows the number of establishments that received services by size.

Table 1. Establishments That Received On-Site Consultation Services by Establishment Size, FY 2012 – FY 2016*

Establishment Size Category by Number of Employees**	Establishments	Employees
1 to 25	15,718	97,550
26 to 100	9,022	270,798
Over 101	3,774	892,584
Total	28,514	1,260,932

*Excludes FY 2014, see fn 3

** See fn1 for explanation

Source: OSC Program Performance Summary (FY 2017)

Estimating the Value of the On-Site Consultation Program

OSHA set out to determine the annual economic value to society, in general, and to workers and employers, specifically, from injuries and illnesses prevented by the interventions provided through the OSC Program. Economic benefits to workers are

³ This analysis averages four years of data from the OSC Program between FY 2012 and FY 2016 and excludes data from FY 2014 because a lengthy government shutdown at the beginning of that fiscal year affected the OSC Program’s ability to conduct consultation visits.

realized through prevented injuries and illnesses and include factors such as reduced pain and suffering, a decrease in lost income (above and beyond that compensated by workers' compensation), and avoidance of the dislocating effects of permanent partial disabilities. Worker benefits were calculated via the willingness to pay (WTP) to avoid risk method, which is preferred by economists for this purpose. Fewer injuries also mean less money paid out by the workers' compensation system, so these reduced payments are considered a benefit as well. These reduced payments are not savings directly realized by employers, but reduced workplace injuries and reduced payments from the workers' compensation system will eventually lead to reduced premiums for employers. In this study, savings to the workers' compensation system are accounted for separate from savings to employers. Economic benefits to employers include the avoidance of various indirect costs associated with workplace injuries, illnesses, and deaths. Such indirect costs include loss of productivity, the cost of hiring and training replacement workers, property damage, and time spent on administrative tasks such as accident investigations or filing claims.

To date, no empirical studies examining the effects of OSC Program visits on injuries and illnesses have been conducted. To estimate the societal benefits of the OSC Program, OSHA examined programs similar to OSC that have been evaluated for effectiveness. Evaluations have found that safety and health programs, as well as OSHA enforcement inspections, reduce injuries (see for example, Smitha et al. 2001), and the magnitude of these reductions forms the basis for estimating the benefits of the OSC Program from reducing injuries.⁴ OSHA has identified three approaches to estimating the number of injuries prevented by the OSC Program – to treat OSC visits as a(n):

1. One-time, one-year safety and health program
2. Hazard-reduction exercise; or
3. OSHA enforcement inspection.

Based on these three approaches, OSHA derived a range of estimates of the number of injuries prevented by OSC Program visits. These estimates are based entirely on avoidance of OSHA recordable injuries and illnesses and do not measure the value of fatalities avoided or chronic illnesses avoided. The existing empirical studies are simply not of large enough scale to detect statistically significant differences in numbers of fatalities, nor to detect differences in the incidence and fatalities from chronic illnesses. As a result, the benefits estimated in this paper are likely underestimated, because they exclude important sources of benefits.

Consistent with the Office of Management and Budget Circular A-4, OSHA assessed the value of avoided injuries using a WTP method, where the value is derived from the willingness of affected individuals to pay to avoid a marginal increase in the risk of a non-fatal injury. Workers place an implicit value on occupational injuries avoided, which

⁴ OSHA is examining injuries, rather than fatalities and occupationally acquired chronic illnesses, because data are more readily available, and the short-term nature of the OSC Program (and similar interventions) makes it difficult to link avoided chronic illnesses back to the program activities.

reflects their willingness to pay to avoid monetary costs (for medical expenses and lost wages) and quality-of-life losses as a result of an occupational injury. OSHA estimated the value of avoided injury at \$77,000 per case (in 2015 dollars, which reflects the low end of estimates developed by Viscusi and Gentry, 2015).

Employer benefits are described in terms of workers' compensation savings. Typical workers' compensation injuries cost insurers about \$30,526 each, on average, based on the total program costs for workers' compensation and the total number of reportable injuries in the private sector (Baldwin and McClaren, 2016; Bureau of Labor Statistics (BLS), 2013).⁵ These will not be direct savings to the employer but to the workers' compensation system; however, the savings will eventually be realized to some extent by employers as insurance premium savings.

OSHA also estimated the benefits to employers of avoided indirect costs from occupational injuries, which include costs of hiring and training replacement workers, administrative costs, and lost productivity. The estimate used is from a Business Roundtable publication, *Improving Construction Safety Performance*, and is based on a study conducted by the Stanford University Department of Civil Engineering (OSHA, 2017). While the magnitude of indirect costs is inversely related to the seriousness of the injury, for the purposes of this analysis, OSHA used the lowest estimated ratio from the Business Roundtable publication and estimates that the indirect costs are equal to 110 percent of direct costs considered to be the cost of a workers' compensation injury.⁶

For this analysis, OSHA used a rate of 3.0 injury cases per 100 equivalent full-time workers in private industry, as estimated by the BLS for 2015 (BLS, 2016). Based on this rate, and the number of workers who are covered by consultation services on average, OSHA estimated that there are potentially 37,828 injuries annually among the workers whose workplaces received consultation services. Given that the OSC Program targets high-hazard industries, using the average injury and illness rate for all firms likely underestimates the potential benefits of the program.

Applying these values of avoided injuries to an estimate of the number of avoided injuries that result from OSC Program visits, OSHA estimated the value of the OSC Program, using the three approaches listed above and described in detail below.

The Safety and Health Programs Approach

Safety and health programs have been proven to substantially reduce the number and severity of workplace injuries and illnesses and the associated financial burdens on U.S. workplaces. Employers can use safety and health programs to establish and maintain

⁵ This value is derived by taking the total cost of the workers compensation system in 2013 of \$91.8 billion (NASI, 2016) divided by the number of recordable injuries - 3,007,300 (BLS, 2013) - which yields a workers' compensation cost per injury of \$30,526.

⁶ The estimated indirect cost ratio ranges from a high of 4.5 for injuries with direct costs of less than \$3,000 (i.e., the indirect costs are 450 percent of direct costs) to 1.1 for injuries with direct costs greater than \$10,000. See OSHA, 2017 for more information.

processes to identify and control hazards in the workplace, with the goal of reducing risk and preventing occupational fatalities, injuries, and illnesses.

Safety and health programs are built on a set of common sense pillars, including:

- Management commitment to safety and to finding and fixing hazards.
- Worker participation in all aspects of the program and are encouraged to report any hazards or concerns.
- Hazards that are identified are addressed expeditiously, with an emphasis on eliminating the hazard entirely.
- Goals for the program are set every year, and progress towards these goals is monitored and reported.

OSHA previously published a white paper outlining the key features of safety and health programs and examining the evidence of their effectiveness (OSHA, 2012). More recently, OSHA published the *Recommended Practices for Safety and Health Programs*, a guide to help employers and workers implement their own program (OSHA, 2016).

Numerous studies found strong evidence of the effectiveness of safety and health programs. The 1991 Texas Extra-Hazardous Employer Program encouraged firms with injury rates substantially higher than the industry average to adopt safety and health programs. An analysis of that program found firms that completed the program reduced their injury rate by between 49 and 77 percent (LaTourrette and Mendeloff, 2008). In a 2012 review, OSHA found that safety and health programs in eight states that either required or provided incentives for employers to adopt a program lowered the injury and illness incident rate by between 9 and 60 percent (OSHA, 2012). Based on this analysis, OSHA estimated that safety and health programs can help reduce injuries 15 percent to 35 percent for employers who newly implement a safety and health program (OSHA, 2012).

For the purposes of this paper, OSHA selected the midpoint of that range and estimated that a fully implemented safety and health program can lower injury rates by 25 percent in the first year the program is implemented. If a consultation visit produces results similar to those seen when employers implement a safety and health program, the OSC Program could prevent 9,457 injuries each year (see Table 2). Using \$77,000 as the value of an avoided injury, the benefits to workers from the injuries avoided as a result of the OSC Program, using the safety and health program approach, could total about \$728 million per year.

In addition, the cost savings to the workers' compensation system would be about \$289 million per year, and the value of the indirect costs avoided (using the estimated value discussed above, where indirect costs are equal to 110 percent of the direct costs) would be about \$318 million per year. Using this approach, the total benefits of the OSC Program are estimated to be \$1.3 billion annually.

**Table 2. Annual Benefits of the OSC Program:
Safety and Health Program Approach**

Covered Workers	1,260,932
Estimated Injuries per Year	37,828
Injuries Prevented by OSC Program Visits	9,457
Value of Avoided Injury per Injury	\$77,000
Benefits to Workers from Avoided Injuries	\$728,188,374
Workers' Compensation Cost per Injury	\$30,526
Benefits to the Workers' Compensation System from Reduced Claims	\$288,684,134
Benefits to Employers from Avoided Indirect Costs	\$317,552,547
Total	\$1,334,425,056

Limitations of the Safety and Health Program Approach

There are some limitations to the data on the effect of safety and health programs on the rate of workplace injuries; for one, the data usually measure results only from facilities that fully implement a safety and health program. This means that only facilities where management recognizes an opportunity to improve performance and supports safety and health programs are captured in the data on the effectiveness of the programs. While the exclusion of reluctant employers may affect the veracity of estimates of the benefits of safety and health programs when evaluating the potential effectiveness of statutorily imposed mandatory requirements for safety and health programs, the voluntary, employer-initiated nature of the OSC Program means that employers who receive OSC Program services are those that are committed to improving the safety of their workplaces. Therefore, the rates of reduction in injuries seen in the literature are likely representative of the rates of reduction in injuries from OSC visits.

The data on safety and health program effectiveness also suggest a possible “regression to the mean;” in other words, after a few years, performance slides back to pre-intervention levels and the effects seen in the initial years disappear. Because this analysis is only considering the effects of one year of OSC Program activity and is not drawing any conclusions about the longer-term program effectiveness, the data on the initial effects of safety and health programs are adequate for the purposes of this study. Note that the estimated results presented in this paper are annual average numbers, and OSC Programs interact with employers and workers on a continual basis. Even if the effectiveness of the OSC Program at a given facility decreased once multiple years had passed since the employer’s interactions with the program, there are still sizeable benefits being realized annually as new workplaces engage with the OSC Program.

Finally, to the extent that consultation visits result in long-term adoption of safety and health programs, this approach could underestimate the effects of consultation visits.

Hazards Removed Approach

An important aspect of each consultation visit is how the consultant helps the employer identify and control or eliminate hazards. OSHA Information System data revealed that from FY 2012 to FY 2016, the OSC Program identified an average of 109,582 serious and imminent danger hazards at the facilities they visited each year. Proactively abating workplace hazards has been shown to reduce injuries (see Mendeloff, 1996, for example); however, the quantitative relationship between hazards removed and the associated decreases in injuries is not well known.

The best data on the relationship between hazard identification and decreases in injuries comes from Mendeloff's (1996) evaluation for OSHA of the Maine Top 200 Experimental Targeting Program, which provided intensive, targeted workplace safety and health interventions to the 200 employers in Maine that had the most workplace injuries, based on workers' compensation claims filed in 1991. The Maine Top 200 program required employers to, among other things, conduct a baseline comprehensive survey of their facilities to identify hazards and submit a plan to abate those hazards. These activities were evaluated and monitored by OSHA.

The 184 firms that participated in this program identified 98,500 hazards in their baseline surveys and reportedly had corrected more than half of those hazards by September 1994. By July 1995, the number of hazards identified had exceeded 174,000, with more than 118,000 reportedly abated. Subsequently, firms in the Maine Top 200 program saw a significant decline in the number of lost workday injuries or illnesses (Mendeloff, 1996).

Based on the number of hazards identified and abated, and the decrease in reported injuries and illnesses in the Maine Top 200 study, OSHA estimated that for each 10 hazards eliminated, one injury was avoided. Data published by Gormley and Balla in 2007 show that, between 1991 and 1994, the number of injuries with at least one lost workday in Maine fell by 9,100, while the Maine Top 200 report measured at least 50,000 hazards abated by mid-1994 and 118,000 hazards abated by 1995. OSHA assumed that about 90,000 hazards were abated by the end of 1994. Dividing 90,000 hazards by 9,100 injuries gives a ratio of about 10 hazards remediated to one injury prevented. Since hazard identification and abatement are integral parts of the OSC process, it is reasonable to apply these reductions to facilities that receive services from the OSC Program. Based on OSC data for FY 2012 to FY 2016 that show that an average of 109,582 hazards were identified annually, this means that an average of 10,958 injuries may have been prevented by the OSC Program each year (see Table 3).

Using these reductions and \$77,000 per injury avoided, cost of a workers' compensation injury, and ratio of indirect costs to direct costs discussed previously, OSHA estimated the following economic value of the benefits of the OSC Program:

- Benefits to workers from avoided injuries: about \$843 million.

- Benefits to workers' compensation: about \$335 million.
- Benefits to employers from indirect costs avoided: about \$368 million.

In total, this approach results in estimated benefits from the OSC Program of about \$1.55 billion annually.

**Table 3. Annual Benefits of the OSC Program:
Hazards Removed Approach**

Hazards Identified	109,582
Injuries Avoided	10,958
Benefits to Workers from Avoided Injuries	\$843,777,550
Benefits to the Workers' Compensation System from Reduced Claims	\$334,508,487
Benefits to Employers from Indirect Costs Avoided	\$367,959,336
Total	\$1,546,245,372

Limitations of the Hazards Removed Approach

Due to the uncertain relationship between hazards identified and removed and reductions in work-related injuries, this model is a somewhat less robust method for evaluating the benefits of OSC Programs. The data from the Maine Top 200 study clearly show a decrease in the number of reported lost-time injuries and illnesses over the five years evaluated. However, the decline may be related to reforms of Maine's workers' compensation system, economic factors such as increases in unemployment or changes in worker demographics, and potential under-reporting. There is also some evidence that more workers who were injured or became ill were being placed on light/restricted duty sooner and more frequently during the evaluation period of the Maine Top 200 program, which could have significantly decreased the number of injuries being reported to workers' compensation, because they did not need to be reported (Maine Workers' Compensation Board, 1997).

Another concern with developing a causal relationship between hazards identified and reduced injuries was that the Maine Top 200 Program did not have a standard definition for what to include as a "hazard" on the employer's self-reported hazard list. Some inspectors reported hazards on a very detailed level (e.g., every electrical outlet that did not work was counted as a separate hazard), while others reported hazards in a more general manner (e.g., electrical system deficiencies were listed as one hazard). Some inspectors identified many minor hazards that were unlikely to result in injuries (and therefore would be unlikely to reduce injuries when the hazards were abated), while others identified fewer, but more serious, hazards (which may have been putting workers at higher risk of injury; and thus abatement of such hazards may have been more likely to result in avoided injuries). This adds additional uncertainty to the effect that identifying hazards has on reducing injuries.

Finally, when looking at the ratio of hazards eliminated to injuries prevented, the data on this relationship are limited. If the hazard-injury relationship differs, then the economic value of OSC Programs would vary as well. For example, the analysis above assumed that one injury is prevented for every ten hazards abated. If, in fact, the actual abatement factor differs, then the effectiveness of the OSC Program would change proportionately. So while the available data suggest the 10-to-1 ratio is appropriate (ten hazards abated lead to one injury avoided), given the uncertainty in the data, this approach is less reliable than the safety and health program approach.

The OSHA Enforcement Inspection Approach

OSHA enforcement program evaluations have found that employers' injury rates fall in years following an OSHA enforcement inspection. Since the process of an OSHA inspection and a consultation visit share similar features—both aim to identify and abate workplace hazards—one could expect that consultation visits will reduce injury rates in subsequent years just as OSHA inspection visits do. Scholz, et al. (1990) found that a 10 percent increase in enforcement activities reduces injuries by about one percent for large, frequently inspected firms. Haviland et al. (2008) estimated that firms with 20 to 250 employees experience a 10 percent reduction in injury rates when they have an inspection with a penalty. Similar results have been found by Mendeloff and Gray (2005) and from analysis of the results of the Maine Top 200 program (Gormley and Balla, 2007). Based on these findings, OSHA hypothesized that OSC Program visits could have a similar effect on injury rates, i.e., a reduction of about 10 percent.

From FY 2012 to FY 2016, OSC consultants visited private sector establishments with an annual average total of 1.26 million employees. Assuming a 3.0 percent injury rate (BLS 2016), about 38,000 injuries could be expected to occur among those 1.26 million workers. If the OSC Program visits yield similar reductions in injuries in the year following the visit as OSHA inspections do, then the injury rates in the subsequent year would be 10 percent lower, meaning there would be about 3,800 fewer injuries and the OSC Program benefits would be as follows:

- Benefits to workers from avoided injuries: about \$291 million.
- Benefits to the workers' compensation system from reduced payments: about \$115 million.
- Savings to employers from avoided indirect costs: about \$127 million.

Using this approach, the estimated total annual benefits of the OSC Program are about \$534 million per year.

**Table 4. Annual Benefits of the OSC Program:
OSHA Enforcement Inspections Approach**

Number of Employees Covered	1,260,932
Expected Annual Injuries	37,828
Injuries Prevented (10 percent)	3,783
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Benefit to Workers from Avoided Injuries	\$291,275,350
Benefit to Workers' Compensation System from Reduced Claims	\$115,473,654
Benefits to Employers from Indirect Costs Avoided	\$127,021,019
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Total	\$533,770,022

Limitations of this OSHA Enforcement Inspection Approach

Comparing consultation visits to OSHA enforcement inspections may not be a fair comparison. Inspections are, in general, very limited compared to the comprehensive scope of a consultation visit. Data from the OSC Program and OSHA enforcement inspection records show that OSC workplace evaluations find twice as many hazards as OSHA enforcement inspections do. OSC consultants have a lower threshold for classifying hazards as serious, in part because they do not issue citations or fines, which require compliance officers to collect additional evidence to support the citation. Since the program is voluntary and initiated by the employer, consultants usually have workplace records readily available and receive employer assistance in abating all known hazards.

Employers who are subject to OSHA enforcement inspections may not be forthcoming with information that could open them up to additional citations and fines. OSC consultants conduct wall-to-wall inspections of facilities in order to identify and abate as many hazards as possible; OSHA inspection visits are narrower in scope and generally cannot address an entire facility when looking for violations. Finally, one of the aims of the consultation visits is to help employers improve their safety and health programs. This means that, even after the consultation has ended, worker safety will likely remain a priority, as employers continue to identify and abate new hazards.

During OSHA enforcement inspections, the focus is not on program improvement, so the impacts of an inspection on injury rates and hazard identification and abatement are likely to be lower than the impacts of a consultation visit. Consultation visits likely yield a greater reduction in injury rates over the subsequent year than OSHA enforcement inspections do, which means that the benefits estimated by this method are well below the true benefits of the OSC Program.

Conclusion

The three different approaches described above have varying degrees of comparability when it comes to estimating the effect and value of OSC Program visits. For all methods used, OSHA did not estimate the benefits of avoided fatalities, occupationally acquired chronic illnesses, and premature deaths due to occupationally acquired chronic illnesses. However, it is likely that the OSC Program has an impact on these incidents, as well as reducing injuries from traumatic accidents. These simple models also do not attempt to measure the ongoing effect that a consultation visit may have on injury rates.

With those caveats in mind, OSHA estimates that the total value of the OSC Program is between \$534 million (using the OSHA enforcement inspections method) to \$1.5 billion (using the hazards removed method). While the estimated value of these benefits varies depending on which method is used, each method shows that there are significant benefits being derived from the program. Even at the low end of the estimated range, there are still thousands of workers who have likely avoided injury as a result of the OSC Program.

**Table 5. Total Annual Benefits of the OSHA On-Site Consultation Program
(millions of dollars)**

	Safety and Health Program Approach	Hazards Removed Approach	OSHA Enforcement Inspections Approach
Benefits to Workers from Avoided Injuries	\$728	\$844	\$291
Benefits to the Workers' Compensation System from Reduced Claims	\$289	\$335	\$115
Benefit to Employers from Avoided Indirect Costs	\$318	\$368	\$127
Total Value^[a]	\$1,334	\$1,546	\$533

[a] Totals may not sum due to rounding

Regardless of which approach is used, the OSC Program reduces injuries and illnesses and produces hundreds of millions of dollars in societal benefits each year. The OSHA enforcement inspections approach likely underestimates the true value of the OSC Program. The hazards removed approach, while theoretically plausible, utilizes less reliable data and relies heavily on assumptions about the relationship between hazards removed and injuries prevented. The approach based on efforts to help employers implement a comprehensive safety and health program most closely tracks the OSC visits in form and function. Research has also shown that implementing a safety and health program helps reduce injury rates. Therefore, OSHA has determined that the best method to estimate the benefits of the OSC Program is the safety and health program approach, which estimates that the OSC Program produces benefits to workers, employers, and society of about \$1.3 billion per year.

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