March 30, 2018

National Inmate Survey (NIS-4): Sample Design Evaluation and Recommendations for Jails

Final Technical Plan

Prepared for

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1. Introduction

1.1 Background

The National Inmate Survey in Jails (NIS-4), which is projected to occur in 2020, will be the fourth implementation of the NIS series in local jails. The prior NIS collections were conducted in 2007 (NIS-1), 2008–09 (NIS-2), and 2011–12 (NIS-3). As shown in **Table 1**, the victimization rates for the three key outcomes of interest—(1) any sexual victimization, (2) inmate-on-inmate sexual victimization, and (3) staff sexual misconduct—have remained relatively stable across the three NIS iterations.

Table 1. Victimization Rates by Victimization Type and Study Year, in Local Jails, Percentages

Study Year	Sexual Victimization		Staff Sexual Misconduct
	Overall	Inmate-on-Inmate	
NIS-1	3.2	1.6	2.0
NIS-2	3.1	1.5	2.0
NIS-3	3.2	1.6	1.8

Since the last NIS was completed, two changes have occurred that may affect the NIS-4 estimates. First, the Prison Rape Elimination Act (PREA) standards were introduced. These standards are intended to reduce sexual victimization rates within facilities. Second, as described in ***Section 2***, data from the 2013 Census of Local Jails show that there have been some changes in the makeup of the jail inmate population.

In the first three NIS iterations, samples were drawn for both prisons and jails, and data collection was fielded in both types of facilities simultaneously. The NIS-4 is being modified to field samples of prison and jail inmates consecutively rather than concurrently. As such, this document will focus on the design for the jail sample—the population that will be fielded second. A prior report[1] details the plan for the NIS-4 prison design.

1.2 Analytic Goals

Given the likely changes in victimization rates that have occurred since NIS-3 because of the implementation of the PREA standards, the analysis objectives for NIS-4 will be

[1] Berzofsky., M, & Zimmer, S. (2017, March). *2018 National Inmate Survey (NIS-4): Sample design evaluation and recommendations: Technical plan*. Prepared for the U.S. Department of Justice, Bureau of Justice Statistics. Retrieved from https://www.bjs.gov/content/pub/pdf/NIS4DesignRecommendations.pdf

expanded to measure the impact of these changes. As such, the key analytic goals of NIS-4 include

- estimating the 2019 overall sexual victimization rates for the three outcomes of interest with similar precision to past NIS studies,
- determining whether the sexual victimization rates have changed since the NIS-3 collection,
- estimating the sexual victimization rates among female inmates with similar or better precision than past NIS studies, and
- enabling the estimation of sexual victimization rates by facility characteristics (e.g., facility size, staffing levels, and other characteristics) with reasonable precision.

1.3 Purpose of Report

The purpose of this report is threefold. First, it describes the known changes to the U.S. local jail population and how these changes affect the universe that will be used to select the NIS-4 sample. Second, it describes the results of assessments of the NIS design to ensure that the analytic goals will be achieved. Third, it recommends the optimal design for NIS-4.

2. Population Universe

2.1 Target and Sampling Populations

2.1.1 Target Populations

Two target populations are of interest for the NIS-4 in local jails: (1) all adult prison inmates held in local jails, and (2) all inmates 16 years old or older held in local jails.[2] These target populations for the NIS-4 are designed to allow for comparisons to prior iterations of NIS, when inmates under 18 years old were excluded from national and facility estimates, and for future iterations of NIS, when all inmates held in the facility will be the population of comparison.

2.1.2 Sampling Population for Adult Inmates

The sampling population for the first three iterations of the NIS used the 2005 Census of Local Jails as the basis for defining the jail population. The NIS uses a two-stage sample design—selecting facilities and then inmates within facilities—to reach the sampling population. As such, it is important to understand how changes in the frame may affect the NIS analytic objectives. The 2005 census was the most recent one conducted at the time of each prior NIS iteration.

[2] A small number of juvenile inmates younger than 16 years are held in local jails. These inmates are considered ineligible for the NIS.

The sampling population for the adult target population in NIS-4 will be the 2013 Census of Local Jails—the most recent facility-level census available—which was conducted as part of the Deaths in Custody Reporting Program. **Table 2** compares the facility and inmate population counts in the 2005 and 2013 censuses by sex of inmate. The table shows that the number of jails has slightly decreased and the number of inmates has increased by approximately 2% overall, with a larger increase of among female inmates (11% change).

Table 2. Numbers of Jail Facilities and Inmates, by Sex and Census Year

	Census Year		
Population	**2005**	**2013**	**Change (%)**
Number of facilities	2,951	2,916	−1.1
Number of inmates	724,768	737,659	1.8
Males	633,623	636,261	0.4
Females	91,145	101,398	11.2

Table 3 presents the distribution of jail facilities by the number of inmates housed. In both 2005 and 2013, most jail facilities were small and the average facility size has remained nearly unchanged (217 in 2005 to 220 in 2013).

Table 3. Number of Jail Facilities and Average Number of Inmates by Facility Size and Frame

	2005 Frame		2013 Frame	
Number of Inmates Housed	**No. of Facilities**	**Average No. of Inmates**	**No. of Facilities**	**Average No. of Inmates**
1—499	2,618	106	2,555	111
500—999	206	712	228	623
1,000—1,999	95	1,335	106	1,301
2,000—2,999	21	2,307	20	2,420
3,000 or more	11	3,548	7	4,031
Total	2,951	217	2,916	220

2.1.3 Sampling Population for Juvenile Inmates

In NIS-3, 16- and 17-year-old juvenile inmates were included in the eligible sample population. In preparation for NIS-4, we will consider whether inclusion of juveniles is cost-effective. In other words, given the number of juveniles who can be included in the study and the resulting precision around the victimization estimate, we will assess whether the

additional cost to implement a design that increases the likelihood of including juveniles is worth the potential statistical benefit of being able to detect change.

One important consideration in this assessment is the change in the juvenile population held in local jails. **Table 4** presents the number of juveniles identified on the NIS-3 frame (2005) and the NIS-4 frame (2013). The data show that the number of juvenile inmates has decreased over time. In particular, many fewer jail facilities house 15 or more juveniles.

Table 4. Sampling Population Counts for Juveniles Held in Jail Facilities, 2005 and 2013

	Facilities Containing at Least					
	1 Juvenile		5 Juveniles		15 Juveniles	
Frame	Number	Population	Number	Population	Number	Population
2005	664	270,664	278	177,368	110	103,719
2013	569	243,990	202	145,438	73	78,102

2.2 Response Rates

Overall, among adult inmates in jails, NIS-3 obtained a 60.3% response rate. In NIS-1, the response rate was 68%, and in NIS-2 the response rate was 67%. Among juveniles in jails, in NIS-3, the response rate was 58.4%.[3] Given the changes in the adult and juvenile universe populations and decreases to the inmate-level response rates across NIS iterations, the disposition codes from NIS-3 are presented to assess potential areas in which inmate-level data collection can be made more efficient. The disposition codes are examined separately for adults and juveniles.

2.2.1 Adult Disposition Codes and Response Rates

Table 5 presents the distribution of sampled adult inmates in local jails by final disposition code in NIS-3. As shown the in the table, the two highest areas of nonresponse (response type NR in the table) are "Inmate talked to interviewer but refused to participate," accounting for 15.9% of sampled inmates, and "Inmate left facility after data collection began," which accounted for 6.1% of inmates.

[3] The first and only iteration of NIS to include juveniles was NIS-3.

Table 5. Number and Percentage of Sampled Adult Inmates by Final Disposition Code, NIS-3, in Local Jails

Event Code Description	Response Type	Count	Percentage
Inmate unavailable—off facility grounds	NR	359	0.33
Inmate in segregation (nonmedical)	NR	69	0.06
Inmate in hospital, medical segregation	NR	190	0.17
Inmate unavailable—at facility but not available	NR	312	0.28
Ran out of time to conduct data collection at facility	NR	312	0.28
Inmate refused to come to interviewing room	NR	7,187	6.52
Inmate talked to interviewer but refused to participate	NR	17,524	15.91
Violent inmate—not available for PAPI	NR	843	0.77
Refusal by facility	NR	2,807	2.55
Inmate being held for other authorities	NR	50	0.05
Inmate left facility before data collection began	IN	9,288	8.43
Inmate left facility after data collection began	NR	6,717	6.10
Inmate left facility—date unknown	NR	833	0.76
Inmate being held temporarily at another facility	NR	361	0.33
Inmate serves time only on weekends	IN	100	0.09
Language barrier (Spanish)—no bilingual interviewer at facility	NR	797	0.72
Language barrier (non-Spanish)	IN	185	0.17
Inmate impaired	NR	10	0.01
Mentally incompetent inmate—facility's designation	IN	589	0.53
Mentally incompetent inmate—interviewer designation	IN	228	0.21
Physically unable to complete interview—facility's decision	IN	96	0.09
Physically unable to complete interview—interviewer decision	IN	115	0.10
Inmate transferred to another interviewer for interview	NR	7	0.01
PAPI administration needed	CP	255	0.23
Inmate under age	IN	0	0.00
Juvenile in facility that requires parental consent	NR	4	0.00
Sampled in error	IN	226	0.21
Inmate on unsupervised work release	IN	484	0.44
Coded in error	NR	1	0.00
Multiple facilities sampled—unit not worked	IN	55	0.05
Other	NR	354	0.32

(continued)

Table 5. Number and Percentage of Sampled Adult Inmates by Final Disposition Code, NIS-3, in Local Jails (continued)

Event Code Description	Response Type[a]	Count	Percent
Complete	CP	58,745	53.33
Interview breakoff—facility initiated	CP	52	0.05
Interview breakoff—inmate initiated	CP	911	0.83
Mentally incapable; interview breakoff	CP	56	0.05
Computer malfunction; interview breakoff	CP	13	0.01
Inmate determined to be underage; breakoff	IN	0	0.00
Age not obtained	IN	23	0.02
Total		**110,158**	**100**

Notes. CP = completed interview, IN = ineligible, NR = eligible nonrespondents, PAPI = paper-and-pencil interview. The response rate is computed as RR = CP/(CP + NR).

2.2.2 Juvenile Disposition and Response Rates

Table 6 presents the NIS-3 distribution of disposition codes for juvenile respondents held in local jails. As was true in the adult population, the two most common nonresponse type disposition codes were "Inmate talked to interviewer but refused to participate," which accounted for 11.8% of sampled inmates, and "Inmate left facility after data collection began," which accounted for 6.7% of sampled inmates.

Table 6. Number and Percentage of Sampled Juvenile Inmates by Final Disposition Code, NIS-3, in Local Jails

Event Code Description	Response Type[a]	Count	Percentage
Inmate unavailable—off facility grounds	NR	13	0.53
Inmate in segregation (nonmedical)	NR	3	0.12
Inmate in hospital, medical segregation	NR	3	0.12
Inmate unavailable—at facility but not available	NR	18	0.74
Ran out of time to conduct data collection at facility	NR	46	1.89
Inmate refused to come to interviewing room	NR	97	3.98
Inmate talked to interviewer but refused to participate	NR	288	11.82
Violent inmate—not available for PAPI	NR	27	1.11
Refusal by facility	NR	80	3.28
Inmate being held for other authorities	NR	1	0.04
Inmate left facility before data collection began	IN	191	7.84
Inmate left facility after data collection began	NR	162	6.65

(continued)

Table 6. Number and Percentage of Sampled Juvenile Inmates by Final Disposition Code, NIS-3, in Local Jails (continued)

Event Code Description	Response Type[a]	Count	Percentage
Inmate left facility—date unknown	NR	9	0.37
Inmate being held temporarily at another facility	NR	11	0.45
Inmate serves time only on weekends	IN	1	0.04
Language barrier (Spanish)—no bilingual interviewer at facility	NR	4	0.16
Language barrier (non-Spanish)	IN	2	0.08
Inmate impaired	NR	0	0.00
Mentally incompetent inmate—facility's designation	IN	6	0.25
Mentally incompetent inmate—interviewer designation	IN	1	0.04
Physically unable to complete interview—facility's decision	IN	1	0.04
Physically unable to complete interview—interviewer decision	IN	0	0.00
Inmate transferred to another interviewer for interview	NR	0	0.00
PAPI administration needed	CP	9	0.37
Inmate under age	IN	1	0.04
Juvenile in facility that requires parental consent	NR	126	5.17
Sampled in error	IN	15	0.62
Inmate on unsupervised work release	IN	0	0.00
Coded in error	NR	0	0.00
Multiple facilities sampled—unit not worked	IN	0	0.00
Other	NR	10	0.41
Complete	CP	1,270	52.13
Interview breakoff—facility initiated	CP	3	0.12
Interview breakoff—inmate initiated	CP	34	1.40
Mentally incapable; interview breakoff	CP	2	0.08
Computer malfunction; interview breakoff	CP	1	0.04
Inmate determined to be underage; breakoff	IN	1	0.04
Age not obtained	IN	23	0.02
Total		**2,459**	**100**

[a] Response type: CP = completed interview, NR = eligible nonrespondents, IN = ineligible; the response rate is computed as RR = CP/(CP+NR)

2.2.3 Recommendations to Improve Response Rates

Having reviewed the disposition codes, we offer the following recommendations to improve response rates:

- Review procedures used by interviewers when asking inmates to participate in the study.
- Design and implement a plan for a more robust use of the PAPI instrument when inmates refuse to participate in the audio computer-assisted self-interview (ACASI).
- Work with sampled facilities to reduce the amount of time an inmate must wait to meet with an interviewer, as wait times negatively affected participation.
- Incentives were used in about 75% of local jails in NIS-3. Facilities that allowed incentives had about a 10% higher response rate than those that did not. To the extent possible, work with local jails to increase the use of incentives.
- Consider use of an incentive that may be more appealing to inmates.

3. NIS-4 Design Considerations and Methods

The NIS-4, like its prior iterations, will maintain the basic design considerations detailed in the PREA legislation. These considerations include

- the ability to make facility-level estimates,
- inclusion of at least one facility in each state in the sample, and
- selection of at least 10% of all facilities into the sample.

Given these considerations and the analytic objectives detailed in ***Section 1.2***, to minimize the impact that the design has on the ability to compare estimates over time, we recommend that the basic sample design remain unchanged. That is, a two-stage probability-proportionate-to-size (PPS) design, whereby a stratified sample of facilities is selected with probability proportional to the number of inmates housed in the first stage and a simple random sample of inmates is selected in the second stage, is maintained. However, to maximize the likelihood that the analytic objectives are met, we evaluated the following design parameters to determine their optimal values:

- Impact of the first-stage (facility) sample size
- Oversampling factor applied to female inmates (second-stage oversample)
- Inclusion of first-stage replicate design to account for potential budget constraints in the number of jail facilities in which data can be collected

3.1 Design Considerations

For each of the evaluated design parameters, we assessed the impact that different options would have on the NIS-4 analytic objectives. For each design parameter, we considered at least two different options.

- *First-stage sample size*. The first-stage sample sizes considered included (1) 300 jail facilities and (2) 350 jail facilities, sizes specified by BJS.
- *Oversampling factor of female inmates*. The second-stage oversampling factor of female inmates considered included 1.0, 1.05, 1.10, 1.20, and 2.0.
- *Replicate design*. To evaluate the impact of designs that could accommodate a different number of facility sample sizes without altering the probabilities of selection, a replicate design was considered. Design options that included releases of 150 facilities and 225 facilities were evaluated in conjunction with the base first-stage sample size of 300 facilities.

3.2 Assessment Criteria and Methods

To compare different design parameter options, we considered a predetermined set of evaluation criteria. Moreover, to isolate the impact of each parameter options, we used the same methodology to produce victimization estimates for each option.

3.2.1 Assessment Criteria

The assessment criteria used for each design option included the following:

- *Sample size*. For each option, the resulting number of respondents—overall and by sex—was considered.
- *Relative standard errors (RSEs)*. For each option, the resulting RSEs on the three main outcomes of interest were considered. The three main outcomes of interest include (1) overall sexual victimization, (2) inmate-on-inmate sexual victimization, and (3) staff sexual misconduct.[4]
- *Statistical power to assess change*. For each option, the statistical power to detect a significant difference compared to the NIS-3 estimate was considered. Power was calculated for each of the key outcomes for detectable differences of (1) 0.3%, (2) 0.4%, and (3) 0.5%, which are absolute or percentage point differences. For example, if the NIS-3 estimate was 3.2% for overall sexual victimization, then a 0.3% detectable difference would find that all NIS-4 estimates of 2.9% or less were significant statistically.

3.2.2 Assessment Methods

To develop the evaluation criteria, we conducted a simulation study. Because the second-stage sample size is not fixed (i.e., it will vary based on the set of facilities selected), a set of 1,000 samples were selected for each design option. Sample sizes and RSEs were based on the average values across the 1,000 samples. For determining statistical power, the proportion of times a detectable difference was obtained across the 1,000 samples was used as an estimate of statistical power.

To draw each sample and determine the victimization rate within each facility, the following methods were used:

[4] The definition of these three outcomes is assumed to be unchanged from prior NIS iterations.

- The selection method followed that of prior NIS designs.
  - A PPS design with a size measure equal to the number of inmates in the facility. For designs with only adults, the size measure was the number of inmates in the facility. For designs with juveniles, the size measure was the number of adults plus the product of the number of juveniles and the juvenile oversampling factor.
  - The design ensured at least one facility per state except for Alaska.[5]
  - States with an expected sample size less than 1 were placed in their own strata with a sample size of 1 assigned.
  - The second-stage sample sizes were computed in the same manner to select adults in NIS-3.
- Victimization rates were assigned using the NIS-3 distribution of facility-level victimization rates.
  - On the basis of the NIS-3 mean and standard deviation, a random victimization rate for inmate-on-inmate victimization and staff sexual misconduct rates was assigned to each facility on the frame before samples were drawn (i.e., a facility had one set of victimization rates assigned, regardless of the number of simulation samples in which it was included).
  - Using a multinomial distribution to account for the overlap in inmate-on-inmate victimization, staff sexual misconduct, and the facility's assigned victimization rates, a victimization status was assigned to each inmate housed (based on the population size).
  - Overall victimization status was assigned on the basis of the mode value assigned to inmate-on-inmate victimization and staff sexual misconduct.
  - Rates were assigned for inmate-on-inmate victimization and staff sexual misconduct.
  - Total victimization status for each inmate was assigned if one or both of inmate-on-inmate victimization or staff sexual misconduct was assigned.
- Standard errors were inflated using the design effects from NIS-3 for each victimization type. The design effects were as follows:
  - Inmate-on-inmate: 5.88
  - Staff sexual misconduct: 2.2
  - Total victimization: 4.58
- To estimate the statistical power to detect change, for each detectable difference level, the assigned victimization rates for each facility were decreased by the minimum detectable difference values (i.e., 0.3%, 0.4% or 0.5%).
  - On the basis of reduced victimization rates, the joint distribution was adjusted to ensure the correct decrease in the victimization rates.
  - The adjusted rate for overall sexual victimization was not fixed at the minimum detectable difference to ensure that a real solution for the joint distribution could be obtained.

[5] Alaska was excluded from the one-facility-per-state requirement because of the cost of collecting data in Alaska. Most Alaska jails are small (less than 50 inmates) and remote, making data collection costs higher than in other states.

4. Assessment of National Design

In this section, we present the results of the assessment for a design that does not include 16- and 17-year-old jail inmates. Although 16- and 17-year old inmates will be incorporated into the NIS-4 facility estimates to evaluate the ability to detect change at the national level, we excluded juveniles from this portion of the assessment. As such, the main evaluation question is related to which second-stage oversampling factor of female inmates produced improved precision for estimates for female inmates without greatly affecting the precision of estimates for male inmates and overall estimates.

To assess the oversampling factors, the following statistics were assessed:

- Respondent sample size by sex and jail facility sample size
- RSEs by sex, victimization type, and jail facility sample size
- Statistical power to detect differences with NIS-3 estimates by victimization type and jail facility sample size

4.1 Respondent Sample Size

Table 7 presents the respondent sample size by sex, along with jail facility sample size, for each female oversampling factor. Overall, when 300 facilities participate, the expected respondent sample size is 58,024 jail inmates; when 350 facilities participate, the expected respondent sample size is 67,114. For both facility sample sizes, the expected percentage of respondents who are female ranges from 13% (when oversampling factor is 1.0) to 22% (when the oversampling factor is 2.0).[6]

Table 7. Expected Number of Respondents, by Sex and Jail Facility Sample Size

Female Oversampling Factor	Facility Sample			
	300 Facilities		350 Facilities	
	Males	Females	Males	Females
1.00	50,229	7,804	58,141	8,999
1.05	49,877	8,129	57,703	9,407
1.10	49,548	8,492	57,336	9,771
1.20	48,904	9,105	56,608	10,496
2.00	44,833	13,197	51,934	15,175

[6] An oversampling factor of 2.0 does not double the expected number of female inmates participating because, in some facilities, a census of females would result in an oversampling factor less than 2.0.

4.2 Relative Standard Errors

Tables 8 through **10** present the RSEs for total victimization, inmate-on-inmate victimization, and staff sexual misconduct, respectively, by female oversampling factor, sex, and jail facility sample size. For all three victimization types, for both jail facility sample sizes, the RSEs do not appreciably change for female estimates until the oversampling factor is 2.0. The RSE for male estimates increases as expected, but not appreciably. When comparing the RSEs across the jail facility sample sizes, we note that the increase of 50 additional facilities decreases the RSEs about 1% for all female oversampling factors.

Table 8. Relative Standard Errors for Total Victimization, by Female Oversampling Factor, Sex, and Jail Facility Sample Size

Female Oversampling Factor	Facility Sample					
	300 Facilities			350 Facilities		
	Overall	Males	Females	Overall	Males	Females
1.00	6.0	6.5	13.8	5.5	6.1	12.7
1.05	6.0	6.6	13.6	5.5	6.0	12.5
1.10	6.0	6.6	13.5	5.5	6.1	12.6
1.20	6.0	6.6	13.5	5.5	6.1	12.4
2.00	6.0	6.8	12.5	5.6	6.3	11.5

Table 9. Relative Standard Errors for Inmate-on-Inmate Victimization, by Female Oversampling Factor, Sex, and Jail Facility Sample Size

Female Oversampling Factor	Facility Sample					
	300 Facilities			350 Facilities		
	Overall	Males	Females	Overall	Males	Females
1.00	9.7	11.1	17.3	9.0	10.4	15.9
1.05	9.7	11.2	17.0	9.0	10.3	15.7
1.10	9.7	11.3	16.8	9.0	10.4	15.6
1.20	9.8	11.3	16.9	9.0	10.5	15.4
2.00	9.7	11.6	15.6	9.0	10.7	14.4

Table 10. Relative Standard Errors for Staff Sexual Misconduct Victimization, by Female Oversampling Factor, Sex, and Jail Facility Sample Size

Female Oversampling Factor	Facility Sample					
	300 Facilities			350 Facilities		
	Overall	Males	Females	Overall	Males	Females
1.00	5.4	5.6	17.2	5.0	5.2	15.7
1.05	5.4	5.7	17.2	5.0	5.2	15.6
1.10	5.4	5.7	16.8	5.0	5.2	15.7
1.20	5.4	5.7	16.7	5.0	5.2	15.4
2.00	5.5	5.8	15.6	5.1	5.4	14.4

4.3 Statistical Power

Tables 11 through **13** present the statistical power estimated through the simulations for each level of detectable difference compared to the NIS-3 estimates by female oversampling factor and jail facility sample size for overall sexual victimization, inmate-on-inmate victimization, and staff sexual misconduct, respectively. For all victimization types, within each detectable difference, the statistical power is relatively stable across oversampling factors. In addition, for all victimization types, increasing the jail facility sample size has a minimal impact on statistical power.

Table 11. Statistical Power for Detecting Change for Overall Sexual Victimization, by Female Oversampling Factor and Jail Facility Sample Size

Female Oversampling Factor	Facility Sample, Difference					
	300 Facilities			350 Facilities		
	0.3%	0.4%	0.5%	0.3%	0.4%	0.5%
1.00	65.2	96.7	99.8	70.9	99.3	99.8
1.05	64.5	95.1	100.0	72.0	99.6	99.7
1.10	66.7	96.6	100.0	71.8	99.1	100.0
1.20	62.7	96.5	99.8	72.5	99.2	99.9
2.00	63.7	97.1	100.0	72.9	99.1	100.0

Table 12. Statistical Power for Detecting Change for Inmate-on-Inmate Sexual Victimization, by Female Oversampling Factor and Jail Facility Sample Size

Female Oversampling Factor	Facility Sample, Difference					
	300 Facilities			350 Facilities		
	0.3%	0.4%	0.5%	0.3%	0.4%	0.5%
1.00	8.5	62.4	91.3	11.3	72.9	95.4
1.05	7.9	62.0	90.6	12.4	72.5	94.4
1.10	9.4	61.6	89.8	11.3	69.8	94.1
1.20	8.5	65.2	92.7	12.0	71.8	95.6
2.00	9.1	63.4	90.6	13.1	70.4	95.0

Table 13. Statistical Power for Detecting Change for Staff Sexual Misconduct, by Female Oversampling Factor and Jail Facility Sample Size

Female Oversampling Factor	Facility Sample, Difference					
	300 Facilities			350 Facilities		
	0.3%	0.4%	0.5%	0.3%	0.4%	0.5%
1.00	78.9	96.1	99.9	84.9	98.9	99.9
1.05	80.6	95.0	99.8	86.4	99.4	100.0
1.10	80.4	95.0	99.9	86.8	98.6	99.9
1.20	79.5	96.1	100.0	85.6	99.1	99.9
2.00	76.8	95.8	100.0	86.3	98.9	100.0

4.4 Recommendations for the National Design

On the basis of the simulation analysis, we offer the following design recommendations for sampling adult jail inmates:

- *Jail facility sample size*. Drawing a sample to include 300 participating facilities is recommended. The simulations showed that an increase in the number of participating facilities would have a small positive impact on the evaluation criteria—sample size, RSEs, and statistical power—but the expected benefits are not worth the additional cost associated with conducting interviews in 50 additional facilities.
- *Oversampling factor*. Using a female oversampling factor of 1.20 is recommended. This oversampling factor will increase the number of female respondents by an estimated 1,300 inmates when 300 facilities participate. This oversampling factor is not expected to have a negative impact on either the RSEs or on the statistical power to detect change, and it will provide additional female respondents for subdomain analyses.

5. Assessment of Replicate Designs

Because of potential cost concerns, the NIS-4 design evaluation considered options that would allow for the facility sample size (which is a larger cost component than the within-facility sample size) to be reduced or increased without affecting the design-based weights for the design. On the basis of the findings from the assessment of designs that include adults only and designs that include juveniles, the replicate designs considered use an adult-only design of 300 facilities with a female oversampling factor of 1.20 as the starting design.

For these designs, the evaluation criteria were assessed for potential jail facility sample sizes of 150, 225, and 300. For the replicate design, for each iteration of the simulation, a base sample of 300 was selected using the PPS approach as described in ***Section 3*** with two additional replicates of 75 facilities. The three replicates were created through a systematic sample of the base sample. In the assessment, the replicate of 150 facilities was evaluated by itself, a total sample size of 225 facilities was assessed by combining one of the 75-facility replicates with the 150-facility replicate, and the 300-facility sample was assessed by combining all three replicates. Under this approach, the design weights obtained through a PPS selection method are retained (with the only change to the probability of selection being the number of jail facilities sampled).

5.1 Respondent Sample Sizes

Table 14 presents the expected number of respondents under each facility sample size. When 150 jail facilities are included in the final sample, 30,640 respondents are expected to participate. Under the 225-jail facility design, 44,394 inmates are expected. Under the full 300-jail facility design, 58,142 inmates are expected to respond.

Table 14. Expected Number of Respondents, by Number of Jail Facilities Sampled and Sex

Number of Facilities Sampled Using Replicates	Overall	Males	Females
150	30,640	25,765	4,875
225	44,394	37,406	6,988
300	58,142	49,039	9,103

5.2 Relative Standard Errors

Tables 15 through **17** present the RSE for overall sexual victimization, inmate-on-inmate victimization, and staff sexual misconduct, respectively, by the final number of participating

facilities. The reduction in facilities participating has the greatest impact on the precision for female inmates.

Table 15. Expected Relative Standard Error for Overall Sexual Victimization, by Number of Jail Facilities Participating and Sex

Number of Facilities Sampled Using Replicates	Overall	Males	Females
150	8.9	9.8	19.6
225	7.0	7.7	15.5
300	6.0	6.6	13.2

Table 16. Expected Relative Standard Error for Inmate-on-inmate Sexual Victimization, by Number of Jail Facilities Participating and Sex

Number of Facilities Sampled Using Replicates	Overall	Males	Females
150	14.4	16.8	24.4
225	11.3	13.2	19.4
300	9.7	11.3	16.5

Table 17. Expected Relative Standard Error for Staff Sexual Misconduct, by Number of Jail Facilities Participating and Sex

Number of Facilities Sampled Using Replicates	Overall	Males	Females
150	8.0	8.4	24.2
225	6.3	6.6	19.1
300	5.4	5.7	16.5

5.3 Statistical Power

Tables 18 through **20** present the statistical power for overall sexual victimization, inmate-on-inmate victimization, and staff sexual misconduct, respectively, by the number of jail facilities participating. For a design with 225 facilities, there is reasonable statistical power for all victimization types to detect an absolute change of 0.5%, and for overall victimization and staff sexual misconduct to detect a difference of 0.4%. When the study includes 150 facilities, there is poor statistical power to detect change under all the assessed differences for inmate-on-inmate sexual victimization.

Table 18. Expected Statistical Power for Overall Sexual Victimization, by Number of Jail Facilities Participating and Detectable Difference From NIS-3 Estimate

Number of Facilities Sampled Using Replicates	Difference		
	0.3%	0.4%	0.5%
150	27.8	71.6	93.2
225	51.1	90.7	99.2
300	65.8	96.1	99.9

Table 19. Expected Statistical Power for Inmate-on-Inmate Sexual Victimization, by Number of Jail Facilities Participating and Detectable Difference From NIS-3 Estimate

Number of Facilities Sampled Using Replicates	Difference		
	0.3%	0.4%	0.5%
150	3.9	26.4	58.1
225	7.2	48.1	79.7
300	10.0	64.0	91.2

Table 20. Expected Statistical Power for Staff Sexual Misconduct, by Number of Jail Facilities Participating and Detectable Difference From NIS-3 Estimate

Number of Facilities Sampled Using Replicates	Difference		
	0.3%	0.4%	0.5%
150	50.3	75.5	94.8
225	69.1	90.4	99.1
300	79.9	95.4	100.0

5.4 Recommendations

For the replicate design options, the following recommendations are made.

- *Feasibility*. A replicate design is feasible.
- *Jail facility sample size*. Include as many facilities as possible in NIS-4. If cost constraints require fewer than the optimal 300 jail facilities to be included, then overall estimates are possible, but the ability to produce precise subdomain estimates will be diminished.

6. Final Design Recommendations

On the basis of the findings from each of the design types assessed, the final design aspects recommended include the following:

- *Target population*. The target population should include adult and juvenile inmates held in local jails. However, no special or additional design considerations should be made for juvenile inmates.
- *First-stage design.* On the basis of target population, the first-stage design should be constructed as follows:
  - *Size measure.* The first-stage size measure should be based on all inmates identified on the frame who are 16 years old or older. The size measure should not be increased if 16- or 17-year-old inmates are identified on the frame.
  - *Stratification*. No stratification of first-stage facilities should be created.
- *Second-stage design.* The second-stage design should be constructed as follows:
  - *Oversampling females*. To better allow subdomain estimates for female inmates, a second-stage oversampling of females is recommended. The oversampling factor recommended is 1.20.
  - *Selection of juveniles*. Inmates age 16 or 17 should be selected with the same probability as adults.
- *Facility sample size*. On the basis of the simulation results, the NIS-4 design does not need to include more than 300 facilities. With 300 facilities participating, NIS-4 can achieve its analytic goals. Fewer than 300 facilities can be fielded under a replicate design to allow for more facilities to be fielded later if funding permits. If budgetary constraints do not allow for 300 facilities to be included, the study should try to include at least 225 facilities to allow for reasonably precise overall estimates.
- *Estimation*. To allow for comparable estimates over time, estimates should be produced as follows:
  - *Facility estimation.* Because facility estimates will not be compared over time, all sampled inmates—including 16- and 17-year-old inmates—should be included in the facility-level estimate used for the identification of high-rate facilities.
  - *National estimation.* To allow for comparable estimates to prior NIS iterations, two types of national estimates should be produced:
    - *Estimates that include juveniles*. A national estimate based on all inmates 16 years old or older should be produced. This estimate will include all respondents in the NIS-4. This estimate will not be comparable to prior NIS iterations, but it can be comparable to future iterations of NIS, as they are likely to include juveniles in the target population.
    - *Estimates that exclude juveniles.* A national estimate that excludes 16- and 17-year-old inmates should be produced. For this estimate, a separate national survey weight should be produced that considers 16- and 17-year-old respondents as ineligible, and the survey weights should be benchmarked to those of the adult inmate population. This estimate will be produced in a manner comparable to those of prior NIS iterations and used for estimating change over time.